The Builder.

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The Excavations at Winchester Cathedral.

IN our issue of the 13th of February, page 259, reference was made to the excavation of the foundations of a portion of what was supposed to be the New Minster, founded by King Edward the Elder close to the cathedral, or old Minster, of Winchester. The workmen have laid bare the foundations of what appears to be a nave measuring about 85 ft. from east to west, and about 49 ft. wide internal measurement, with a chancel continuous with the nave or nearly so, 63 ft. long, with apparently the same width, the proportion thus being almost exactly three squares, one for the width to three for the length. The walls have been traced entirely around the south side, the west end, and portions only of the north wall of the nave and the east end of the chancel, the work of excavating being discontinued only from very slender evidences of the existence of the walls being met with, traces of rough foundations alone remaining at a depth of about 8 ft. from the present level of the ground. The south wall is, for the most part, solid from its foundations up to about a foot of the present surface. The excavations show that the whole of the site consists of made ground, which rendered it necessary for the foundations to be carried down to a firmer basis, the earth being full of fragments of Roman brick, rough pottery, tiles, and such like. The walls are roughly constructed of small-sized rubble and flints, laid herringbonewise in some places, with broken Roman brick at intervals, put together with brown gravelly mortar. The ground level was about 1 ft. 10 in. below the present surface, and here there is a set-off of about 2 in. on each side, on which the fair wall, which is 3 ft. 9 in. thick, commences, but it remains only 1 ft. high, the whole of the upper portion having been removed. It is formed of small-sized stones and flints, laid more closely than in the foundation, and solidly bedded in fairly good mortar of whiter colour than below.

At the south-west angle the foundations remain of a very small square enclosure, 5 ft. 5 in. by 5 ft. 6 in. Its walls measure 2 ft. 2 in. in thickness on the east side, and 2 ft. 3 in. on the north side. There is no sign of entrance-door at the level remaining, but the form of the chamber suggests the base of a small tower or turret. No trace remains of a floor, and there is nothing to guide conjecture as to how this building, whatever was its nature, was floored, nor are there any indications of the walls having been plastered. There are traces, and no more than traces, of what appear to have been two internal buttresses or piers, within the nave, on the south side, and of a larger one at the junction with what we have called the chancel; but there is no projection either of pilaster, pier, or buttress along the whole 157 ft. of the outer face of this south wall, a circumstance not a little remarkable. There is no special evidence of style or age, but the appearance of the masonry is sufficient to show that it is very early work, very different from the earliest Norman work in the adjacent cathedral.

Such, in fact, are the feeble traces which very painstaking search has revealed. No more have been met with. The result is not so satisfactory as might have been expected, and it must be a matter of regret that the building had been so completely demolished as to leave such slender signs of its former existence to reward the explorers.

While there is so little in the remains thus found to show anything of the stateliness we should expect from a royal foundation of such an important class as New Minster appears to have been, there is a doubt in some minds as to whether or not the remains met with are not those of one or another of the Saxon cathedrals of Winchester rather than those of New Minster.

In our issue of February 20th (p. 295), the Dean, under whose direction all the works of clearance are being carried out, "thinks it unlikely that the New Minster would have been built on the southernmost line of their territory," and favours the opinion that the remains are those of some former cathedral.

The consideration of local matters of detail merely from references to monastic chroniclers is, doubtless, a work of difficulty and uncertainty, likely to be set aside by some fortunate discovery or by some more direct evidence. Still, the subject of the relative positions of New Minster and the cathedral is sufficiently curious as to warrant a short space being devoted to its consideration. We have already, p. 259, referred to the statement that the New Minster was close to the old one at its foundation, it being partly in the cemetery of the latter, on a contracted and costly site. The excavations show that the burials come close up to the south wall, while the wall itself, without projection or transept, seems to show that it was so designed to form a boundary line. At any rate, had this been the intention the building, whatever it was, could not have been planned better to suit the ground, supposing that the intention was to come close up to the boundary. Then there is the reference to the removal of New Minster on account of the troubles consequent upon the ringing of the bells, &c., owing to its proximity to the cathedral. The actual nearest distance from the Norman transept of the latter is but 27 ft., a sufficiently small distance to occasion trouble; but if the foundations are not those of New Minster it must follow that the latter was on some other site which would have been further away, which would have lessened the trouble referred to, if not have prevented it altogether. The small distance, therefore, supports the statement of the old chroniclers, and is in favour of the site being that of New Minster. A good deal of weight must be attached to the references of the Norman rebuilding of Winchester Cathedral by Bishop Walkelin, for if it can be shown that a new site was then chosen for the building, then it follows that some little uncertainty may attach to the identification of New Minster. While we know that the Saxon cathedral was close to New Minster, it is the Norman cathedral which is referred to as experiencing the evils from the proximity, thus supporting the belief that the Normans rebuilt upon the old site, as was the almost universal custom. We may conclude that they commenced the rebuilding at the east, and probably extended the building westward.

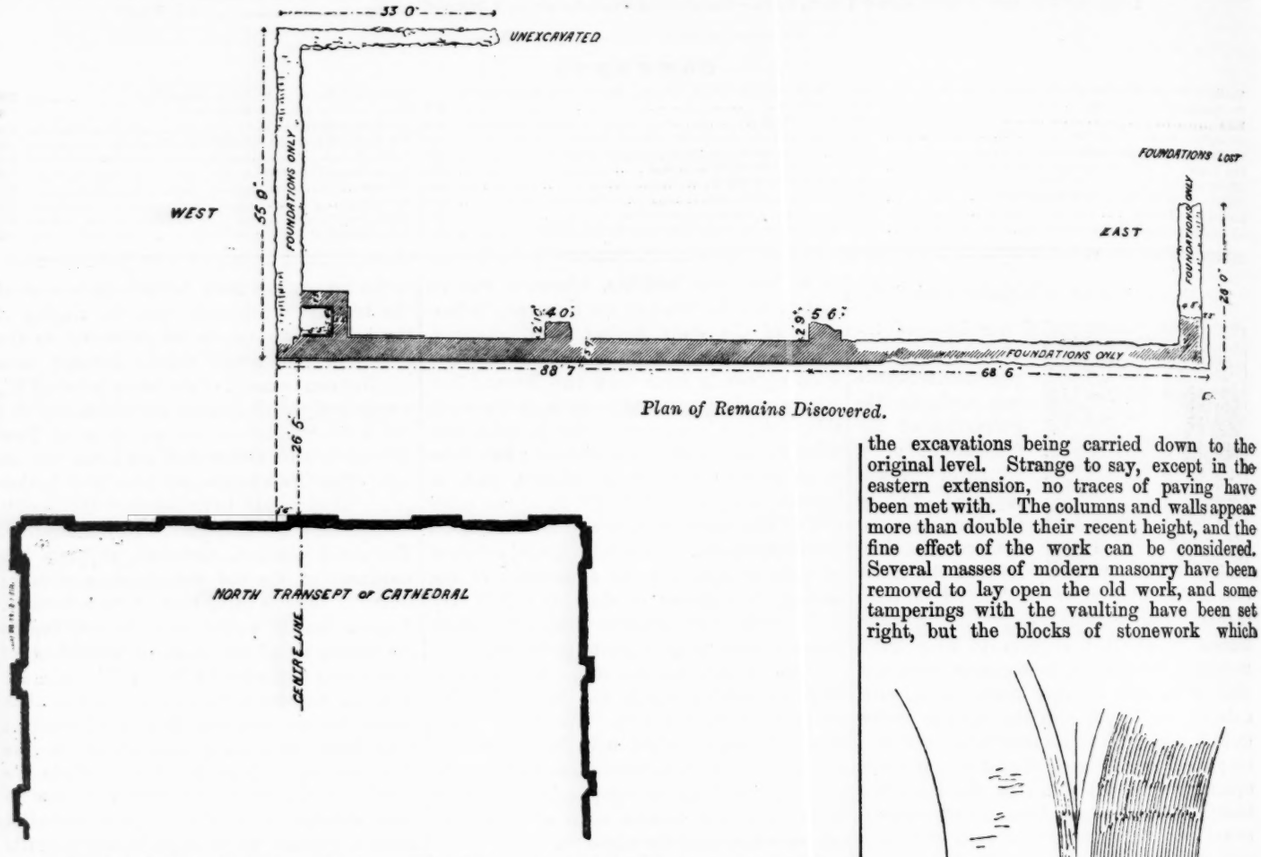
The records of that event show that Walkelin left standing the domestic buildings while he was erecting the new ones, and that for some time after the cathedral had been rebuilt and the new domestic buildings occupied, a portion (one altar) of the old Saxon church was left standing. Now this is more consistent with the supposition that Walkelin rebuilt his church on the same axis, but more to the west, than that he went to a new site altogether; for if the foundations now laid open are those of the old cathedral, then the old domestic buildings, if in their usual place on the south side, would have been in the way of his work. But we find there is an ancient cemetery in this place, which prevents the supposition that there were buildings there. Is not this more likely to have been the cemetery of the cathedral, in its proper position on the north side, in relation to the present church, rather than the cemetery of a cathedral more to the north, on its south, or unusual, side?

But Rudbourne tells us that Walkelyn took down the western portion of the old domestic buildings to enable him to rebuild them, which also points to the fact that he was working on the same lines, but more to the west, of the old Saxon work. A curious little structural point has been brought more prominently forward by the removal of earth from the crypt of the cathedral, which appears to

support the same line of reasoning. The whole of Walkelyn's work is faced with squared stone with wide joints, alike on the inner and outer faces of the crypt. At the junction of the charming Norman crypt of Walkelyn's Lady-chapel, where its eastern apse ends at the western commencement of Bishop Lucy's extension, there is to be seen on the north side and also on the south side alike, a mass of rubble walling formed of small stones, remarkably like the early work of the foundations we have been describing. While the contrast of these fragments is at once apparent as being unlike the Norman work, it is still different to the thirteenth-century work of Lucy's. That it existed before the work of the latter bishop is at once apparent, for the first, the most westernmost, of his wall shafts, north and south, is made of less height than the others in consequence of the existence of these masses of masonry. His work is accommodated to them. It is within the bounds of fair reasoning to say that these fragments of walling mark the east end of the Saxon cathedral. If so, they are conclusive that the latter stood on the same site as the present one, and we may suppose that Walkelyn, while completing his choir, left the Saxon choir standing for a time, so as not to interfere with the services, and on its site he afterwards erected his curious long Lady-chapel, bringing its east end up to the extreme end of the old Saxon work. No settlement has occurred on any of this portion of the work, but it may be noticed that Lucy's eastern extension has sunk materially to the east. This is not evidence of very much value, but we may assume, on the hypothesis stated, that a site occupied by buildings for a long series of years would be firmer than the extended portion on new ground.

Be these foundations what they may, and slender as they are, they are worthy of all the attention we can bestow upon them, since they illustrate a subject of which we know so little, namely, what was the plan of a large Saxon church?

These remains appear to indicate to us that there was a church consisting of a long nave without aisles (unless the great width between the walls was divided by wooden columns, which is not unlikely) joined to a similar aisleless chancel, a plan unlike anything at present known to us of such a building of such dimensions. The largest churches of Saxon date in existence are cruciform; that in Dover Castle and some others having its tower over the crossing; that at Worth, cruciform and having no original tower at all. The plan of the old cathedral of Sidnacester (Stow) appears also to have been cruciform from the portion of the north transept remaining. The plan of a nave and chancel only is familiar enough to us, since it occurs in a great number of Saxon churches, but only in buildings of small or moderate size, nothing at all equalling the length of the foundations now laid open, and which we must consider as being unique in respect to their size. In the cases referred to the chancels are of less width than their naves, a distinction not observed here.



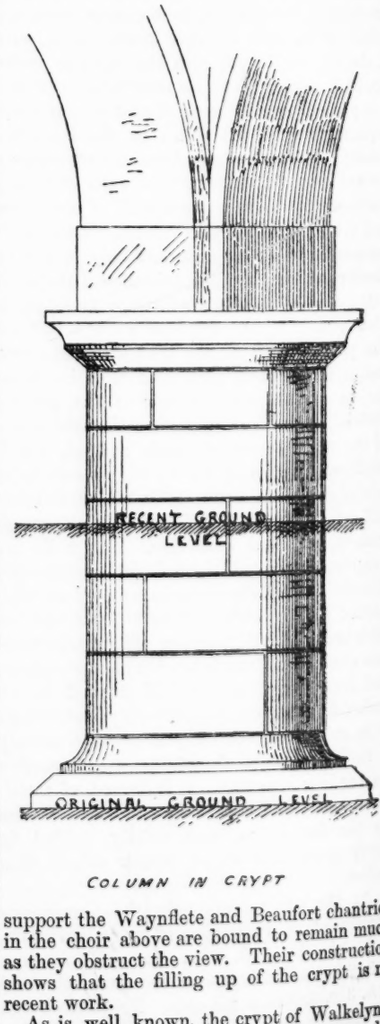
Plan of Remains Discovered.

A comparison with some of the largest of our pre-Norman churches may not be without interest. These are mostly of small dimensions, and the following buildings, fairly moderate as are their sizes, have to be referred to as the largest. The cathedral of Sidnacester, as it may fairly claim to be, is, perhaps, the first as regards dimensions, the Saxon transepts having a length of about 90 ft., the present nave and chancel being about 150 ft., and the original was probably longer. Brixworth is about 136 ft. long; church in Dover Castle, 117 ft.; Worth, 98 ft.; Stanton Lacy, another transeptal church, 64 ft., without its later chancel. The chancel of Jarrow Church is 42 ft. long, which shows that it was part of a building of some size.

So far as regards width, there is little in anything actually existing to compare with the width of 49 ft.; Brixworth nave is about 32 ft. wide; Reculvers nave, 23 ft. 6 in., nave and aisles, 48 ft. 6 in.; Worth, 28 ft.; Dover Castle, 27 ft.; Stanton Lacy, 20 ft.; Jarrow chancel, 16 ft. 6 in. These figures are given approximately only from various published plans.

Let us turn to the works in progress in the crypt of the cathedral. Any one who is familiar with this fine old work will be most agreeably pleased with the altered appearance which is taking place day by day. The old proportions were so seriously destroyed by the level of the earth being several feet above the original floor line, that the work could only be studied under great disadvantage, the curious caps of the heavy central columns emerging from the earth only a little below them, the shafts being about one half buried, their bases being completely out of sight, and the walls appearing very low. The enormous mass of accumulated earth is being gradually carried away in baskets, and as it thus appears a finely altered appearance is the result.

The piers are being opened out to view to their entire height, and their bases revealed, the excavations being carried down to the original level. Strange to say, except in the eastern extension, no traces of paving have been met with. The columns and walls appear more than double their recent height, and the fine effect of the work can be considered. Several masses of modern masonry have been removed to lay open the old work, and some tamperings with the vaulting have been set right, but the blocks of stonework which



COLUMN IN CRYPT

support the Waynflete and Beaufort chantries in the choir above are bound to remain much as they obstruct the view. Their construction shows that the filling up of the crypt is no recent work.

As is well known, the crypt of Walkelyn's Lady-chapel remains in all but perfect condition, notwithstanding that the chapel itself soon gave place to Bishop Lucy's extended work. It indicates precisely the size and

place of what Walkelyn erected. It has a range of central shafts, consisting of single columns, but their effect has been marred for centuries by a mass of walling built between them. This is being removed in order to detach the columns, and when completed a charming effect will result when seen from their junction with the crypt of the cathedral, the pointed-arch work of Lucy's square east-ended extension being in full view beyond it.

The walls of Walkelyn's work were pointed with a broad square band of excellent mortar, fully 1 in. wide, the joints being neatly squared. Some of this pointing has always been visible in various parts of the cathedral, but the recent works have demonstrated that it is original, and not done at some later period, for it is found in perfect condition on some of the portions of walling which have now been opened to view after having been buried for many centuries. The internal walls have never been plastered, only the vaulting; and there is no evidence that colour has been used to any portion.

THE INSTITUTE AND ITS CHARTER.

AFTER two meetings, one continued to a late hour on Monday evening, and the second occupying the greater part of Tuesday, the general meeting of the Institute of Architects has adopted, in the main, the form of charter as recommended by the Charter Committee, only one or two of the numerous alterations made in the wording affecting it in any important principle.

It is not our intention to report in any detailed manner the proceedings of what was essentially a private meeting; the official report is already in the hands of those whom it especially concerns. Some portion of the proceedings on Monday, indeed, are much better left unrecorded; and the member who made the principal attack on the proposals of the committee, in one of the most discourteous and unseemly speeches that we ever had the misfortune to listen to, ought to feel that he owes some gratitude to the persons whom he attacked in this manner for their expressions of willingness, at the close of the second meeting, to condone and forgive an exhibition of vituperative oratory which, however, is not likely to be altogether forgotten. Apart from this, the proceedings at the two meetings may be regarded as satisfactory in their results. A great many points were considered in a very full and mostly business-like spirit, and (what is more) a conclusion was arrived at; and by the process of taking the meetings consecutively till the matter was gone through, the country members who had attended for the purpose of taking part in the debate were enabled to see it through without the inconvenience of a long stay or a second visit to Town for the purpose; an inconvenience of which they have complained, with good reason, on former occasions, when important debates have been cut short and adjourned to a distant date. To two of the provincial members, it may be observed, Mr. Connon (Leeds), and Mr. Aldridge (Liverpool), the meeting owed a good many excellent and useful suggestions; and among the London members who have taken an interest in the subject, the Institute ought to feel much indebted to one of its younger members, Mr. E. T. Hall, who has been the originator of a great number of modifications in the form and wording of the Charter, a large majority of which have been adopted, and which ought to establish their author in a reputation at Conduit-street for practical business qualities.

The new Charter as now proposed perhaps errs on the side of being over full in its provisions, though on going through them *seriatim* it did not appear that there was much in them that could very well be omitted. The most important modifications made were, indeed, in the form of addition rather than subtraction. In regard to the clause providing that Associates should have future voting powers, subject to definition or restriction by by-laws, the meeting rather rashly went into definitions on the spot, partly from a wish to have done with a troublesome subject, partly on the ground suggested by one or two speakers, that matters of privilege were much better incorporated in the Charter for good and all, and that there was less chance then of their being overturned or meddled with at any future time. The result was the modification of clause 19, to the effect that in future Associates should be entitled to vote on all questions except the making of by-laws: a result which seemed to give satisfaction to the Associate members present, as indeed it ought. We question the wisdom of conceding as much as that at present; but if it puts to rest a cause of contention it may be as well that a definite conclusion was arrived at without further loss of time. There are a great many members among the Associate class, no doubt, who would be perfectly competent and desirable voters on every subject that comes before the general meetings; of the feeling of some of these there is excellent evidence in the letter from Mr. Richards Julian which we print in another column. But there are unfortunately others who are not. The reasonableness of the views of some of these gentlemen may be gauged by the fact that some of those present openly intimated that they considered they ought to have the same votes and privileges as the Fellows in every way, while paying only an Associate's subscription; and the fitness of some other gentlemen for the additional influence they seek to obtain may be estimated by the fact that three or four of them were reported to have voted clandestinely in the debate of Monday evening: nor is this all that might be said. The best of the Associates would probably prefer to forego for the present some privileges for which they are perfectly qualified, rather than share them with such coadjutors. We very much doubt whether some of the members of the Council are fully alive to the possible consequence to the status of the Institute of the provision which they lightly and good-humouredly passed. They have bestowed the power of voting the election of Fellows on a body more numerous than the Fellows, and containing a certain proportion of men who have not, and perhaps never will have, any very high status, either socially or professionally. Considering the possible combinations in voting for Fellows elected from the class of Associates under these circumstances, the Council will do well to exercise their right of decision as to the putting up of candidates with extra care and discrimination, if they wish to preserve to the Institute the high character and tone which, amid whatever other shortcomings, has always hitherto belonged to it. Ultimately, no doubt, the effect of the compulsory examination on entrance will be to put a bar on the election of undesirable members, and to assist in maintaining a universally high standard both of character and capability.

The other main addition made to the form of the Charter was, on the motion of Mr. Hall, to retain in the preamble the words relating to the spirit and intention in which it was originally conferred, mentioning the importance and dignity of the art of architecture and the desire of the Sovereign who conferred the Charter to assist the architects in their aim of further developing and improving so noble an art, &c. This, as we have before observed, may be considered less necessary now that the importance of architecture is more generally recognised and admitted; but we are glad the meeting decided to retain the words, because they are, in the first place, exceedingly dignified and admirable in expression, and set up a very high view of the subject, and because also they are of interest historically as evidence of the feeling and spirit in which the original Charter was conferred.

We hope the Charter, as now approved by the general meeting, will before long be confirmed and conferred. With this freer scope for its action, the Institute, having got through the formal business necessary to give it the foot-hold for a new start, ought to take up with fresh vigour the higher task of promoting and raising the art of architecture in the spirit embodied in those words of the preamble of the original Charter, which it has wisely determined to keep on record.

NOTES.

THE action of the Railway directors with regard to Mr. Mundella's Bill has had precisely the effect we anticipated. The alarm created amongst shareholders has forced stock upon the market, and a feeling of great uneasiness prevails. The directors have received the support of the shareholders generally, as the latter are very much in the dark as to the real merits of the case, but the press unite in condemning the exaggerated statements which have been made, and the same may be said of the Stock Exchange. The *Economist*, while naturally sympathising with the directors to a certain extent, is of opinion that much that has been said is nonsense,—and mischievous nonsense,—and that the directors must alter their tactics if they wish to achieve any success. It is very improbable that the Bill will be rejected, as the opposition is narrowing down to three or four clauses, and the resolutions passed at the more moderate of the shareholders' meetings were in favour of amendment rather than rejection. The attitude of the traders may be judged by the remarks of the Railway Rates Committee and the Railway and Canal Traders' Association. The former body, in their report presented to the Chambers of Agriculture on the 6th inst., recommend that support be given to the second reading of the measure, though considering it necessary to propose amendments if the Bill is to be accepted as a satisfactory solution of the existing controversy, while the Traders' Association, after condemning the Bill as it at present stands, remarks:—"Nevertheless, we have so much confidence in the public spirit of the present House of Commons that we believe it would be safe to allow the Bill to pass the second reading, and that its vices may be cured in Committee." Both parties look for benefit from the measure, and both find clauses that go against the grain, and the Bill will, doubtless, undergo considerable alterations before becoming law.

WE may note that on Friday, the 2nd inst., on the motion of Mr. W. H. Smith, it was resolved that a Select Committee be appointed "to reconsider the plans and proposals for an Admiralty and a War Office," which in itself we are glad of, as there is, we hope, some chance that the site may be rearranged on the lines suggested by the Institute of Architects. The only information added in regard to the points for the consideration of the Committee, however, is rather ominous, as it is "that it be an instruction to the Committee to report whether some or all of the existing buildings of the Admiralty may with advantage be retained." This looks like a further development of the wretched spirit of parsimony which is practised in regard to Governmental architecture in this country, in place of any preconceived wish to carry out the scheme in a manner more worthy of the nation. We earnestly hope that some Members of Parliament who have a real knowledge of and interest in architecture for its own sake will find a place on the Committee.

THE case of Saunders *v.* Pawley, which was recently discussed before a Divisional Court, involves points which are of some importance to the public at large as well as to our readers. The trial of this action took place in June last before Mr. Justice Day and a special jury, the claim being for damages against an architect, by reason of injuries sustained through the alleged fraudulent representations of the defendant as regards the sanitary condition of a house at Norwood. It was also alleged by the plaintiff that there was a breach of contract, inasmuch as the defendant had stated that the system of drainage was good and had been approved by the Local Sanitary Authority. The case, as presented on behalf of the plaintiff, was that sewer gas escaped into the house at the time of the letting and afterwards, resulting in the serious illness of some of the servants and in the death of the plaintiff's wife from blood-poisoning. This lady had enjoyed an income of 800*l.* a year, and, by reason of the loss

occasioned through her death, and of various expenses necessarily incurred, the plaintiff claimed the sum of 2,400*l.* The jury returned a verdict for the full amount, but execution was stayed upon the defendant paying into Court the sum of 1,000*l.*, pending an application for a new trial, or, in the alternative, that judgment should be entered for the defendant. The arguments in support of this application, and *contra*, have now been heard, and in the result the verdict is set aside, and the defendant obtains judgment, execution being stayed, however, for ten days, in the event of the plaintiff deciding to go to the Court of Appeal. Upon the question whether a civil action could be maintained for the loss sustained by a man in consequence of the death of his wife, Mr. Justice Grove pronounced an unhesitating negative. Upon the other point, as to the alleged representations of the sanitary state of the premises, the Court decided that there was nothing in the evidence to justify the verdict, inasmuch as it had not been shown that the defendant had made any representations which he did not at the time believe to be true; in other words, there was nothing fraudulent or dishonest in his conduct. The case should, however, serve to make people cautious as regards making representations in answer to the inquiries of incoming tenants.

IT is to be regretted that the London daily papers do not follow the fashion of many provincial papers and publish the evidence taken before Select Committees of the House of Commons. Thus the *Freeman's Journal* has recently printed pretty nearly *in extenso* the evidence given by Mr. Robinson, a civil engineer and a member of the Kingstown Town Commissioners, before the Select Committee on the Tenure of Houses in Towns. From his evidence it would appear that leases are renewed in Kingstown on unreasonably high terms; thus a lease at a rent of 6*l.* 10s. a year is renewed for 26*l.* a year, and then another example of an enormous increase. But we fail to find in Mr. Robinson's evidence at what date the old leases began,—a very important factor in estimating the justice or injustice of the new rents. It does not follow that because a man has been paying too low a rent for ten years he is to be allowed to go on doing so. It is clear the whole question largely hinges on this. We are sorry also to find that the bad system of leases for lives still continues in Kingstown. Mr. Robinson also mentioned many instances of overcrowding and of houses falling into decay, all of which evils he put down to the leasehold system. It has, doubtless, many evils to answer for, but we can scarcely put all of these matters to its door. If a woman, as Mr. Robinson stated, lives in a room 6 ft. by 9 ft. and 5 ft. high, with an open dustpit and a privy by its side, we should certainly say that this is the fault of the sanitary authorities, not of a system of leasehold tenure.

AT the ordinary meeting of the Institution of Civil Engineers, held on Tuesday, the 6th inst., Sir Frederick Bramwell, F.R.S., President, in the chair, Dr. Percy Frankland read a paper on "Water Purification: its Biological and Chemical Basis." In considering the various attempts to purify water by the removal of suspended particles, he said that the passage of micro-organisms through filtering material had long been considered, and, until recently, there seemed to be little reason to doubt that the majority of filtering substances offered no barrier; but a series of carefully-conducted experiments had recently proved that certain materials are less favourable than others to their passage; and this degree of efficiency was more or less maintained by a frequent renewal of the filtering material. He had found invariably, that very porous substances, like coke, animal and vegetable charcoal, were highly efficient in removing organic matter from water when the latter came in contact with them by a process of agitation. Dr. Clark's precipitation process for softening water with lime had a most marked effect in removing micro-organisms from water. The process consists merely in the addition of a small quantity of slaked lime. The chemical improvement resulting from this softening process is not often considerable; but it is found to reduce the presence of micro-organisms 98 per cent. He was satisfied that the only explanation of the freedom from micro-organisms of water taken direct from deep wells was to be found in the fact of its having been subjected to a long and exhaustive process of natural filtration. He thought the effect of this natural filtration upon the biological condition of water could not be better understood than by comparing water obtained from the Thames and the Lea with deep-well water taken from the chalk near London. While, in the last case, as few as eight organisms per cubic centimètre will not unfrequently be found, the number in the case of the two former may, and often does, reach as many thousands.

A REPORT on the sanitary arrangements in various parts of Italy is of considerable interest in these international days, when so many English elect, for climatic and other reasons, to make their home in foreign countries. There are 8,259 communes in Italy, and of these there are only 318 which have thought it worth while to keep up any inspection of the water-supply. Of these, 198 have good drinking-water, 85 tolerable, and 35 bad; of the remainder (a very large majority) 1,454 allow that the water is either indifferent or very bad, while 509 have returned the supply as being very scanty. There are 4,877 communes totally unprovided with sewers, and 1,503 from which no information was received, the inference therefore being that nothing good could be reported. As to dwellings, 37,206 were subterranean, giving shelter to 101,457 persons, while 2,836 deplored the dearth of salubrious habitations. In the Abruzzi, the Basilicata, Apulia, and the Roman Campagna, many families live in hollows scooped out of the rock or tufa. In 1,876 communes there are no latrines, and the sewage remains in open ditches, close to the houses. In 3,976 there are closets, but only in the houses of the well-to-do. In 158 communes the excrements are emptied out of the windows into the street, where they remain until dispersed by the combined action of wind, rain, and scavenger dogs. In 1,483 communes the houses are unprovided with chimneys to the fireplaces, so that the only exit for the smoke is the door or the window. In 259 *circondari*, 194 are more or less troubled with malaria, which spreads over at least 90,000 square kilomètres, and affects about 6,000,000 people. In 1879 there were in Italy 97,855 persons suffering from pellagra (the result of malaria), and this number had increased by 1881 to 104,067. Between 1835 and 1885 Italy has been visited seventeen times by cholera. To wind up this rather unsatisfactory condition of things, 326 communes have no burial-ground.

THE building trades of Rome, where a very large number of new houses are in course of construction, are greatly exercised at the sudden collapse of many of these schemes, sometimes even before the buildings are finished. The rage for speculative undertakings of this kind is becoming as great a nuisance in some parts of Italy as it is in England; but although scamped work is no novelty with us, it has never gone to the same length as at Rome. About a fortnight ago a large building gave way at Prato di Castello while a number of masons were at work upon it, and several were killed; while, more recently, another house has fallen, though it had been in existence longer than the other. The evil has become so serious that the municipality has at last issued an order that the owner of every building in course of erection must make a return of the name of the architect employed, accompanied by a declaration of the latter that he accepts the responsibility of any accident that may occur. Until this is done, the works will not be allowed to proceed. The architects have one and all concurred in this, and have come forward most creditably to assume the supervision of all future operations. There is clearly a great need of some such system, seeing that the number of skilled masons in Rome is comparatively small, and that the great majority of the workers are men who have never been on a roof-top in their life, but whom lack of agricultural employment has driven into the towns to gain a livelihood as best they can.

THE recently decided case of Kiddle & Son *v.* Lovett ought to afford a lesson to those who, having entered into a lawsuit, hurry hastily into a compromise. It was an action by a firm of builders who had taken a contract to paint the outside of a house. They engaged a separate contractor to put up boat-staging for the purposes of the work. During the progress of the work some of the staging gave way, so that one of the painters was thrown into the street and injured. He brought an action against Messrs. Kiddle & Son under the Employers' Liability Act. They, just before the case came on for trial, settled the action for a sum of 125*l.* Then they brought the present action to recover this sum as damages from the contractors who had put up the staging. Mr. Justice Denman held that they were entitled to recover against the contractors, because they had erected a defective staging, but he also held that Messrs. Kiddle & Son could not recover the damages paid to their workman because he had no right of action against them, since no act of negligence had been committed by them or their servants, and, consequently, they were under no liability to pay the 125*l.* Therefore, they obtained judgment for nominal damages only, without costs. The unfortunate position of Messrs. Kiddle, who compromised the action in which they were right and fought out that in which they were practically wrong, certainly provokes a smile.

SOME little time since we commented on the fact that in the Birmingham Workhouse Infirmary Competition, the architect who had prepared the particulars on which the instructions were based was not, as he should have been, debarred from competing, and we drew attention to the feeling expressed in correspondence in the Birmingham papers, that this state of things was calculated to give such a competitor an unfair advantage over others. The result seems unfortunately to have only too well justified these anticipations. In a letter to the *Birmingham Daily Post*, Mr. Victor Scruton calls attention to the fact that only six architects responded to the invitation to compete (the profession seem to have been wiser than usual in this case), that among the six was the architect who prepared the particulars, and that his plans have been accepted. Mr. Scruton pointedly contrasts this with the course pursued in the case of the Birmingham Assize Courts Competition, where Mr. Waterhouse, who had occupied an analogous position as architectural adviser of the Corporation before competition was determined on, withdrew from any claim to compete, and acted only as assessor, being, by his previous knowledge of the wishes of the Corporation, specially qualified to do so. In this latter case 134 architects competed; in the former only six. The one competition was manifestly intended as a fair one from the outset; the other was suspicious. We hope promoters of competitions will read the lesson conveyed.

IN answer to a question asked by Mr. Stuart Wortley in the House of Commons a few days ago, in regard to the antique sculptures concealed in the basement of the British Museum, Mr. H. Fowler, after describing the conditions of light under which these works were placed, and stating that in favourable weather they can be viewed and sketched by students though they cannot be visited by the general public, added that "the room formerly occupied by the department of prints and drawings can be made to accommodate the principal part of the sepulchral monuments at

an estimated cost of 1,600*l*." If so, we hope this small sum will be voted for the purpose on the first opportunity, and the soul of Mr. Newton set at rest in regard to this portion of the works of which he has so long been the careful and learned custodian.

SO Lord Carrington's house is not to be removed *en bloc*, after all! The necessary plans and calculations had all, it is said, been made, and the *modus operandi* determined, when the exigencies of the Lands Department of the Crown necessitated an abandonment of the scheme. It is very much to be regretted on some grounds that so interesting an experiment should have been nipped in the bud. But the want of a permanent Minister of Public Works, and the rapid revolutions of the political wheel, render changes of this kind inevitable, we suppose, in building matters.

THE BUILDING TRADES' EXHIBITION.

THE seventh annual Building Trades' Exhibition was opened in the Agricultural Hall, Islington, on Monday; but, as usual, was far from ready then. So dilatory, indeed, were some exhibitors that their "Stands" were not completed even so late as Wednesday evening. The present exhibition is perhaps a trifle better than last year's display, but several well-known and prominent exhibitors hitherto (Messrs. W. H. Lascelles & Co., to name only one) refrain from exhibiting this year, while some others who have in former years occupied considerable space are this year content with very small displays. There are, it is true, one or two new names of repute in the list of exhibitors (such as Messrs. Randell, Saunders, & Co., and Messrs. Heaton, Butler, & Bayne); but, on the other hand, the space in the hall is not fully occupied, though stalls for the sale of bead necklaces, pincushions, and other miscellaneous trifles whose connexion with the building trades it would be hard to discover, have been allowed standing-room. On the whole, the present show only confirms us in our oft-repeated opinion that these exhibitions recur at too-frequent intervals to be of much real value as an index of progress in the building trades. We know that they are regarded by many of the exhibitors as something akin to nuisances, and one of the largest exhibitors in the present exhibition has, within the last two or three days, given forcible expression to this sentiment, coupled with a wish that something could be done to put down these oft-recurring displays, the iteration of which is, even in this exhibition-ridden age, a great bore. Possibly some of the exhibitors were led to take space because this year the exhibition is styled the "*Architectural* and Building Trades' Exhibition," the only apparent ground for this additional nomenclature being that, by some arrangement into which it does not concern us to inquire, the show is announced as being held "under the auspices" of a society whose pretensions, as indicated in the preface to the catalogue, are about on a par with those of the famous "Three Tailors of Tooley-street."

Messrs. Shanks & Co. (Bay 1) exhibit a varied assortment of baths, lavatories, water-closets, urinals, and other sanitary appliances and fittings. An enamelled stoneware pedestal sitz-bath, shown by these exhibitors, has the merit of compactness.

One half of Bay 3 is occupied by Messrs. E. Aldous & Sons, who exhibit their hot and foul-air extractor for ventilating houses and ships. This appliance has been described by us on the occasion of former exhibitions. The same exhibitors' "Inlet and Exhale Double-Action Ceiling Ventilator" is claimed to be "automatic and perfect in action," and, no doubt, this claim is a good one if, in all states of wind and weather, the respective channels for warm and cold air are found to keep to their allotted work. One merit which this ventilator possesses consists in the absence of moving parts. A double-trapped earthenware closet for fixing above the floor-line, and somewhat cumbrous in form, is shown at this Stand; also a ventilating gas stove for heating purposes.

Bays 4 and 5 are occupied by Messrs. H. & G. Edwards with a good display of school-desks, furniture, fittings, and teaching appliances.

The Patent Victoria Stone Company (Bay 6) exhibit the practical applications of their excellent material in the shape of steps, paving-flags, sinks, &c. A specimen of this stone, after five years' wear under the heavy and almost continuous pedestrian traffic at the corner of Commercial-street, Whitechapel, presents a good and even surface, such as would hardly be possible, we should say, with the best York flagging after such a trial. The same material is shown in its "ornamental" applications, but these constitute the least satisfactory part of the display.

In Bay No. 7 are shown Kaye's Patent Automatic Locks and Door Openers, two exceedingly good and simple applications of which are adapted to railway-carriage doors. One of these forms of lock, we are informed, has been adopted for use by the Great Northern Railway Company, after careful trial. Excellent locks and handles for shop and office doors, calculated to work for years without the many vexations incident to older forms of door furniture where the wear is heavy and incessant, are shown by the same exhibitors.

Bay No. 8 is apparently in the joint tenure of the Pulsometer Engineering Co., the Remedy Ventilator Co., and other exhibitors. Of the well-known pumps of the first-named Company we need say nothing. Of the "Remedy" ventilator, also adaptable for use as a chimney-cowl, we will only call attention to it without expressing an opinion as to its efficiency.

The Broomhall Brick and Tile Company have at this Stand a good selection of their well-known moulded and perforated bricks, which, for trueness of shape and excellence of quality, are not surpassed by any others. They also exhibit their patent roofing tiles. The 3½-in. lap-tiles are especially worthy of notice. They are light and cheap. Hard by, Messrs. T. J. Mayfield & Co. have a small display of electric-bell apparatus, burglar-alarms, &c.

The Thames Bank Iron Company (Bays 9 and 10) have a large display of tubular, saddle, and other boilers for heating purposes. They have also a good show of hot-water fittings, such as pipes, coils, valves, &c. The back-water way saddle-boilers are now made by this Company up to 5 ft. 6 in. long. At this Stand are also exhibited some cast-iron traps, soil-pipes, bends, and junctions. The patent "Expander" for facilitating the jointing of hot-water pipes is also shown.

Bay 11 is occupied by Mr. R. Howard, with a horticultural building and gearing, calling for no special remark except that the levers and cranks of the gearing seem to be likely to be somewhat in the way of the plants which the building is to contain.

Messrs. Ewart & Son (Bay 17) exhibit their "Dido" gas bath, enamelled with Price's "chez-lui," a hard drying enamel. The "Dido" bath seems to be very compact, and is fitted with the "shower" geyser or water-heater, which is rapid in action, and possesses other merits. The "Empress" Ventilator, in various forms, is shown by the same exhibitors.

Messrs. J. Pickles & Son, of Hebden Bridge, Yorkshire (Bay 18), exhibit a small collection of very well made woodworking machinery, including a saw-bench and an improved moulding machine, as well as spiral-cutter planing-machines.

Bays 19, 20, and 21 are occupied by Messrs. Wrinch & Sons, of Ipswich, with two horticultural buildings and a summer-house, which call for no special remark.

Bay 22 is occupied by Mr. W. Harris with an improved cast-iron horizontal pug-mill, for shafting, and a vertical standard pug-mill with chain wheel.

Bay 23 is sparsely occupied by a few brick-making appliances, including Whitehead's brick press.

Mr. J. Matthews, of Weston-super-Mare (Bay 24), exhibits Poole's patent bonding-roll square-cornered roofing tiles and a variety of rustic and other vases, hanging flower-pots, &c., for horticultural use.

In Bay 25 Messrs. J. E. H. Andrew & Co., Limited (Stockport), exhibit the "Stockport Silent Gas Engine," which works very smoothly and is fairly-well entitled to its name. This and two "Bisschop" gas engines at the same stand serve to drive two or three of Messrs. F. W. Reynolds & Co.'s excellent wood-working machines.

Messrs. Carter & Co., of Poole, Dorset (Bay 26), exhibit some very good encaustic and glazed majolica tiles. These are excellent in quality and colour. There are a variety of hand-painted tiles and panels, of which some of the figure-subjects are good. Other panels, on the contrary, all stated to be hand-painted, are too realistic and naturalesque in style, some of them being more suggestive of varnished oleographs than of anything else. In the rear of their Stand this firm have an exhibit more worthy to come to the front than some of the pictorial panels just mentioned, viz., a new kind of wall decoration which is called "tile fresco in outline." It consists of a number of buff tiles, 6 in. by 6 in., put together so as to form a panel about 6 ft. by 5 ft., on which is drawn a seated figure symbolical of "Education" teaching a group of young children. These figures are all in outline merely, and the dark lines, burnt in on the lighter ground of the tiles, are very effective. The surface is unglazed. This method of wall-decoration, which is stated to be comparatively cheap, seems likely to have a future.

Stand 1 (Avenue A) is tenanted by Mr. R. Adams, who exhibits his "Anti-accident Window," patent doorsprings, &c.

At Stand 3 Messrs. Burney & Co., of Millwall, exhibit galvanised iron tanks and cisterns.

Messrs. C. Kite & Co. (Stand 5) exhibit their excellent exhaust and other ventilators, of the merits of which we have often spoken. Besides these they exhibit a quite newly-patented invention, the "Counterpoise" silent automatic valve for smoke-flues and extraction shafts, which appears to embody a valuable improvement. Their mirror-ventilators are ornamental as well as useful, and likely to disarm the preternatural susceptibilities of people who always fancy they "feel a draught" when they know they are in the proximity of a ventilator.

At Stand 8 Mr. J. Robson exhibits his patent drip-tiles for weathering cornices, chimney-stacks, parapets, &c. We spoke of their merits in one of our notices of the Inventions Exhibition last year.

Mr. P. Maignen (Stand 10) exhibits his "Filtre Rapide" and his patent process for softening water.

At Stand 13 Messrs. Muldoon Bros. show their system of wood-block flooring and asphalte wood pavements for roadways. They also have a good display of enamelled slate chimney-pieces, tile-hearths, stoves, &c.

The Adamantine Clinker Pavement, so well adapted for stables and yards, is exhibited at Stand 14 by Messrs. Towers & Williamson in conjunction with Musgrave's patent stable gulley.

At Stand 17 Messrs. T. J. Marshall & Co. exhibit some good stained-glass work suitable for domestic purposes.

Tighe's patent door-knobs and handles are shown in a case at Stand 20. The door-handles have no tap screws.

At Stand 24 is shown a new form of protected sash-fastener (Garrood's patent), which at first sight appears to be somewhat cumbrous and complicated, but its patentee claims that it is absolutely thief-proof, and incapable of yielding to the persuasions of the "drop-key" and other tools of the expert burglar.

The Luton Brick and Lime Company (Stand 24) exhibit an archway showing the use of their grey and red Luton bricks, which are most effective in appearance when not used with that sham known as "tuck-pointing."

Messrs. A. Attwood & Co., late Salmon, Barnes, & Co. (Stand 27), show some good self-sustaining lifts and hoists, and a model of their patent revolving shutters.

At Stand 29 Messrs. Smith & Turner show their admirable adjustable silent door spring, which is likely to meet with increased favour as it becomes better known. They also show Ben Turner's regulating door springs, and other excellent door and window furniture.

A simple form of sash-fastener is shown by Messrs. A. Lewis & Co. (Stand 33). This fastener will be found proof against being forced back by the insertion of a knife or other instrument between the meeting-rails of the sashes, provided that the slit in the arm be exactly adjusted in fixing.

At Stand 59 Messrs. Poulton & Son, of Reading, exhibit a doorway built up to show the use of their red and grey moulded and enriched bricks.

Messrs. A. Cappello & Co. (Stand 61) have a small but good display of mosaic work for floors and for wall-decoration.

Mr. W. F. Stanley (Stand 63) has a small display of surveying and drawing instruments. There is also exhibited at this Stand one of

Mann's cement-testers, for testing cement by adhesion.

Messrs. Wenham & Waters (Stand 65) exhibit plumbers' work and sanitary fittings, including a regulating-supply lavatory.

Stand 69 is occupied by the Coalbrookdale Company, who have a very good show of cast-iron mantels and overmantels, besides stoves, grates, fenders, and railings.

Messrs. Ewart & Son (Stand 71) are exhibitors of baths and other sanitary appliances.

Messrs. T. Lawrence & Son, Bracknell, have a small structure (Stand 72) exhibiting the use of their red rubber and facing bricks. The red facing work is executed with the exhibitors' improved hand-made and hand-pressed facing bricks, which are free from sand-flaws, and leave nothing to be desired in colour and texture. The adaptability to plain and fancy wall tiling of the "T. L. B." tiles is shown at the rear of the Stand.

At Stand 73 Messrs. Robert Boyle & Son (Limited) have a very good display of their well-known specialities, including their most recent developments. The reputation of this firm for such appliances is of long standing.

Messrs. E. & J. M. Verity (Stand 74) exhibit some of their well-known and convenient appliances for opening, closing, and fastening fanlights and sashes.

Messrs. Johnson, Clapham, & Morris exhibit specimens of their patent wire lathing, which affords an admirable key for the plaster.

Mr. J. J. Carpenter (Stand 79) exhibits what he calls "the patent combined fast and slow combustion stove," which embodies an idea which we do not remember to have seen worked out before. This stove has really two bottom gratings, one sliding over the other on the "hit-and-miss" principle, thereby affording means for regulating the rate of combustion.

At Stand 80 Mr. M. F. C. Turpin has a very good display of parquetry and dado work, excellent in execution and material.

The Willesden Paper and Canvas Company demonstrate, at Stand 81, the waterproof qualities and other advantages of their excellent light roofing material.

The House Sanitation Company (Stand 87) exhibit some of the sanitary appliances patented by Mr. Thomas Durrans, A.R.I.B.A., including cast-iron drain-pipes with screw joints to facilitate inspection or removal. The "Aëri" filter, which consists essentially of a porous porcelain tube, is also shown at this Stand. A new form of trap for sinks, called the "scour" trap, is ingenious, though simple, the water passing through it receiving a spiral motion so as to prevent the unsealing of the trap by the too sudden passage of the water. The central portion of the trap is removable for the purpose of cleaning out the sink-pipe when necessary.

Messrs. H. and C. Davis & Co. (Stand 88) exhibit their "Metropolitan" and other gas-kitcheners and stoves, to the great merits of which we have referred on previous occasions.

Mr. Joseph Westwood, jun. (Stand 96), exhibits Hawksley's patent treads for stairs, which are coming largely into use, not only for railway stations, but for warehouses and other buildings where there is much wear and tear on the staircase. An adaptation of the invention to the purpose of hydrant-covers has been largely used in the City.

Messrs. Brazier & Son (Stand 97) exhibit their "aromatic" and deodorising water-closets and other sanitary fittings, which have been noticed by us on former occasions.

At Stand 104, Messrs. Jeffrey & Co. have a good representative collection of their non-poisonous wall-papers, which are all admirable in design and colour.

Mr. J. M. Boekbinder (Stands 106 and 112) exhibits some of his carton-pierre and fibrous plasterwork, for interior decoration, as well as a number of specimens of painted tapestry.

At Stand 110, Messrs. Hayward Bros. & Eckstein have a good show of their specialities, foremost amongst which we must place their well-known "semi-prism pavement lights" and their self-locking coal-plates.

Mr. Julius Sax (Stand 111) exhibits electric bells and apparatus.

Roberts's rain-water separator, described at length in another column, is shown at Stand 115. An illustration and description of this will be found on another page.

The "Lincrusta" and General Decorating Company (Stand 118) exhibit, in conjunction with their decorative specialities, a mantelpiece and overmantel provided with a folding screen for use when the fire is not required.

Messrs. George Wright & Co. (Stand 123) have a good display of slow combustion and other stoves, with marble and wood chimney-pieces, tiled hearths, &c. A speciality to be noticed is their patent bivalve grate. Some very good close and open fire kitcheners are shown by this firm.

Messrs. F. W. Reynolds & Co. (Stand 124) exhibit their double-handed locks and one of their mortising machines.

Messrs. A. Moore & Co. (Stand 128) have a display of stained-glass work, including a good window for the New Pump Room at Bath.

Mr. John Smeaton (Stand 129) exhibits a collection of very good sanitary appliances and fittings, including one or two novelties. Among these we may mention a swing-urinal for affixing to doors and in other positions where space is restricted. A dust-shoot, shown at this Stand, for use in artisans' dwellings, is so arranged as to prevent the passage of foul odours into the dwellings should the hopper be left open. Smeaton's new patent water-waste preventing valve for water-closets (manufactured by John Warner & Sons) is also shown at this Stand.

Messrs. Heaton, Butler, & Bayne (Stand 131) exhibit some good stained and painted glass; a part of a painted reredos for Croswaite Church, Kendal; and part of a reredos for Mr. C. Lucas, Warnham Court,—the latter designed by Mr. A. W. Blomfield, and both painted and decorated after the style of the screens in the churches of Norfolk and Suffolk.

Mr. George Jennings (Stand 133) has a good display of sanitary appliances and fittings, including a new form of his pedestal vase closet. Baths, lavatories, urinals, housemaids' closets, water-waste preventers, stoneware and other traps, plumbers' and other brasswork, go to form what may be taken as a fair representative show of the work of this well-known exhibitor.

Messrs. Woollams & Co. (Stand 135) exhibit a good variety of their excellent non-poisonous wall-papers, including a number of new designs, which are well worth the attention of visitors.

The New Patents Development Association (Stand 136) exhibit specimens of "wood-carving" by machinery. We believe that the process consists in the main of burning or charring off the superfluous wood, so that the term wood-"carving" is rather a misnomer. The work produced is, no doubt, cheap, but it is flat and spiritless.

Mr. Henry Bassant (Stand 139) makes a very good display of parquetry work for floors. Teak seems to be coming into increased use for this purpose, and with very good effect.

In the centre of the hall the Æolus Water-spray and General Ventilating Company have a very good show of their well-known appliances for ventilating and warming, and at Stand 119 they exhibit a number of drawings showing the application of the appliances to churches and other buildings. Of the effectiveness of these inventions we have often spoken.

At Stand 141 Messrs. Diespeker & Co. have a good display of marble mosaic pavements and of glass and marble mosaic wall decorations.

Messrs. Frederick Jones & Co. (Stand 145) exhibit their silicate cotton or slag-wool, with especial reference to its use in protecting exposed iron-work in buildings from the action of fire.

Messrs. Starkie, Gardiner, & Co. (Stand 147) have an excellent show of wrought-iron work as applied to lamps, gaseliers, fenders, grilles, &c.

Mr. Jos. F. Ebner (Stand 150) exhibits some very good marble mosaic flooring and glass mosaic wall decorations, all good in colour and design. Mr. Ebner's parquetry work is not excelled by any that we have seen, and he exhibits a new method of attaching it firmly to basement floors without the necessity for any under-flooring. The same method is equally applicable for use in connexion with fireproof construction. Some good woodwork in the shape of doors, dadoes, and mantelpieces is shown by the same exhibitor.

Messrs. Nettlefold & Sons (Stand 152) exhibit locks and door furniture of all kinds, and in conjunction with them Messrs. Richardson, Ellson, & Co. have a small display of wrought-iron work.

Messrs. George Jackson & Sons (Stand 156) exhibit some new and good designs for ceilings and mantels in fibrous plaster. These will well repay inspection. They represent sections of ceilings which have been put in at the Badminton and Constitutional Clubs, under the direction of Mr. R. W. Edis, and at the new addition to the Junior Carlton Club-house, under the direction of Mr. J. Macvicar Anderson.

Mr. Thaddeus Hyatt (Stand 157) exhibits his well-known pavement-lights and other cognate appliances for transmitting daylight to basements of buildings. The tile-illuminated gratings have a decorative appearance, while they afford a better foothold than the glass lights alone.

Wilkes's Patent Metallic Flooring and Eureka Concrete Company (Stand 158) exhibit some of their specialities in paving work and fireproof construction. These, as well as the architectural enrichments shown, are well worth notice.

Messrs. Randell, Saunders, & Co. (Limited) exhibit the application of their well-known Bath stone for external purposes, as exemplified in the porch of the Church of St. Lawrence, Catford Bridge, Lewisham, the greater part of which is actually built upon the floor of the exhibition-hall. The architect of the church is Mr. Hugh Roumieu Gough. The plinths and bases are of Westwood Ground stone, the shafts and arch moulds of Corsham Down stone, while the interior lining is of Farleigh Down. The stone has been admirably selected and worked, and goes very well with the red brickwork and diapers of the walls. The bricks have been supplied by Mr. James Brown, of Cannon-street, and are excellent in texture and colour.

Mr. J. E. Ellison (Stand 162), exhibits his "radiator" and other ventilators.

At Stand 164, Messrs. Lindsay & Co. exhibit their well-known systems of fireproof flooring, the "steel-decking," and their patent trussed concrete flooring, which were referred to by Mr. John Slater in his lecture at Carpenters' Hall the other evening. The built-up steel columns, for use in combination with concrete, should also be seen by visitors to the exhibition.

Messrs. Jones & Willis (Stand 165) have a large show of their excellent and varied productions in the shape of church furniture, fittings, and decorations.

Messrs. Humpherson & Co. (Stand 166) have a good display of sanitary appliances and some good plumbing work. One piece of the latter is quite a *tour de force*, and in our hearing some of the visitors did not hesitate to express their scepticism as to its having been executed out of one piece of lead. The exhibitors, however, state that they are prepared to demonstrate this at any time by performing another piece of work like it.

Webb's Worcester Tileries Company (Stand 167) have a good show of encaustic and other tiles.

Mr. Roger L. Lowe (Stand 172) exhibits his patent wood block flooring, which has many advantages, and is capable of being used with very good effect by variation in the colour and disposition of the blocks.

Messrs. Steven Bros. & Co. (Stand 187) have a very good show of marble, wood, and iron chimneypieces, with grates, fenders, tile hearths, &c., *en suite*. There are also a number of kitcheners and ranges, slow-combustion stoves, baths, manhole covers, &c., to name only a few of the innumerable articles exhibited at this Stand in the way of builders' ironmongery and hardware.

The Madeley Wood Company (Stand 193) are exhibitors of pressed Broseley roofing tiles and wall tiling.

Mr. J. Stannah (Stand 194) exhibits lifts and models of lifts, besides pumps and other articles of builders' plant.

Messrs. Esdaile & Co. (Stand 195) exhibit mouldings, doors, and joinery of English, American, and Swedish manufacture, which may be usefully compared by visitors.

Messrs. M. C. Duffy & Son (Stands 196 and 201) exhibit a large show of builders' turnery. They also exhibit their "Acme" system of solid wood-block flooring, which was not long ago described and illustrated in our columns.

Messrs. Carter, Johnson & Co. (Stand 205) have a good space laid with their tiles for church purposes, which are very good in appearance.

The Decorative Wood Company (Stand 206) exhibit what appear to be *carved* panels for doors, &c., but we believe that they are not carved, but consist of a thin veneer of wood on a layer of pulp, the whole being pressed in moulds. The effect is much sharper and better

than that obtained by the process previously referred to.

Mr. J. P. Lilly (Stand 233) exhibits specimens of the Chilmark & Wardour stones as selected and used for Westminster Abbey.

At Stand 234, Messrs. S. & G. Staple exhibit specimens of Doulting and Ham Hill stone.

Stand 240 is in the occupation of Messrs. Musgrave & Co., who exhibit a large model showing their patent stable fittings. Messrs. Musgrave also exhibit their patent slow combustion ventilating stoves.

Messrs. Geary & Walker (Stand 243) exhibit their wood-block flooring, which is described on another page of this week's *Builder*.

The St. Pancras Ironwork Company (Stand 316) exhibit some stable fittings and a few good specimens of good decorative wrought iron.

Hitchins's Fireproof Plastering Company (Stand 319) have erected a cottage, in the interior of which they exhibit specimens of cornices executed in their material recently for Mr. Chatfeild Clarke and other architects.

There is very little machinery in motion, but among the few exhibitors in this line we may mention Messrs. E. Jacobs & Co. (Stand 329), who exhibit woodworking machinery.

Messrs. Eddington & Steevenson (Stand 343) exhibit mortar-mills and other items of builders' plant.

Mr. E. S. Hindley (Stand 348) exhibits steam engines, &c., specially adapted to the requirements of builders and contractors.

There are very few exhibitors in the Arcade connecting the hall with the Islington-green entrance, but among them are Messrs. Chambers, Monnery, & Co., who exhibit a varied assortment of builders' ironmongery, including their well-known iron wall-ties and some very good cottage kitcheners.

The exhibition will remain open until the evening of the 17th inst.

THE EXAMINATION IN ARCHITECTURE.

THE following gentlemen passed the examination recently held in Leeds by the Royal Institute of British Architects, and are qualified to become candidates for the Associateship, namely:—

Coates, Lister, Halifax.
Fairley, James McLellan, Edinburgh.
Gelder, William Alfred, Hull.
Hesketh, Peter, Manchester.
Ridgway, Frederick William, Dewsbury.
Smithson, William George, Derby.

The following gentlemen passed the examination recently held in London, and are qualified to become candidates for the Associateship, namely:—

Birkett, Isaiah Robert Edmondson, Manchester.
Box, Stephen, Eastbourne.
Collins, Henry Albert, Reading.
Coxhead, Ernest Albert, Eastbourne.
Cresswell, Herbert Osborn, Putney.
Dunn, William, Crouch-hill.
Granger, Frank Stephen, Nottingham.
Grieves, Henry, South Shields.
Gummow, Michael John, Pall Mall.
Gwyther, William Banks, Calcutta.
Hamilton-Gordon, George William, Finsbury-pavement.
Heyes, Austin, Clyde-street, S.W.
Hirst, Henry Cecil Montague, Bristol.
Hooker, Walter, Andover.
La Trobe, James Henry, Bristol.
Low, William Ralph, Basinghall-street.
Milburn, Thomas Ridley, Sunderland.
Mitchell, Arnold Bidlake, Clapton.
Muller, John Joseph, Hampstead.
Oakley, Frank Page, Manchester.
Parkes, Thomas William, Bromley, Kent.
Perks, Sydney, Wandsworth Common.
Pethick, Benjamin Herbert, Paddington.
Scruton, Victor, Birmingham.
Tugwell, Frank Alfred, Scarborough.

Utilising the Coast Guard as a means of National Defence.—The Admiralty are at present erecting a battery and drill-hall at each of the principal Coast Guard stations, constructed on a new plan designed by H.R.H. the Duke of Edinburgh. There will be one large gun in each battery, which will be worked by the Coast Guard men on the station. The first of these batteries and drill-halls have just been completed at Sunderland, and are fitted with all the latest improvements, the ventilation being specially attended to,—Boyle's latest improved self-acting air-pump ventilators being adopted.

FREE LECTURES TO ARTISANS AT CARPENTERS' HALL.

TERRA-COTTA.

THE seventh of the present course of lectures at Carpenters' Hall was given on Wednesday, the 31st ult., by Mr. James Doulton.

Mr. Doulton said,—The term "terra-cotta" is of wide significance, and in its literal meaning embraces in its history and manufacture a period from prehistoric time, and a range of work from the roofing of the humblest cottage to ornaments suitable for the grandest palace.

The earliest mention of burned earth is in Genesis (ii. 3), where the people said, "Go to, let us make brick and burn them thoroughly. Go to, let us build us a city and a tower whose top may reach unto heaven, and let us make us a name lest we be scattered abroad upon the face of the whole earth"; the result being the confusion of tongues at Babel. Many allusions are made in sacred history to clay and the potters' work, the power of God himself being set forth in the similitude of the potter. If we turn to secular history we obtain the same testimony of its ancient character; there is not a country or a people in the world who have not in one form or another some knowledge of pottery, and from the imperishable nature of well-burned clay we have an unwritten history of many countries otherwise unknown. Pottery is constantly being found which gives us another link in the chain uniting us to the far-off ages. The history of pottery really is to a great extent the history of the world. There is a pretty little theory suggested as to the discovery of the properties of clay, which, like many such, is attributed to accident:—Man in his savage state, after forming a hollow in which to hold the embers of his fire, noticed that the earth had become capable of retaining water. This hardening process by the action of heat was turned to practical uses; vessels were made not only for holding, but for carrying, water; bricks for the purposes of building, until little by little that perfection was attained which culminated in the works of Greece and Rome. Doubtless amongst the most popular forms of pottery were the drinking-horns of the Greeks; the term "ceramics" being taken from *keros*, a horn or drinking-vessel. We can but imagine the course that pottery took: first it was merely sun-burned; then artificial heat was applied, producing greater density, followed by yet another step, the introduction of the art of glazing. The kiln was evidently known at a very early period, as is shown by the sculptures of ancient Egypt. The same may be said of the wheel, and to whom we are indebted for this invention it is impossible to say; it appears to have been known at least 2,500 years B.C. One singular fact remains, that notwithstanding the wonderful discoveries and improvements in all else, the potter's wheel remains practically the same as at the commencement of our knowledge of it, the only difference being in the methods of turning it and the motive power used. The earliest type of wheel that we know is that still in vogue amongst many people of the East, in which a heavy wheel, attached to the table on which the clay is thrown, is rapidly turned by the potter, with such force that the momentum attained is sufficient to enable him to throw the form required, the great disadvantage being the necessity for the potter to stay his work and give to his wheel fresh impetus as often as needed. After this the same form of wheel was made, but in such a way as to enable the potter to propel it with his feet, and thus keep a steady, constant motion. There are still men living to whom this was the only method of gaining the necessary rotary motion, and I am given to understand, at the present time there is a Japanese at Knightsbridge showing his skill in throwing, having only this means of obtaining his motive power.

But as large vessels were required this method became totally inadequate and was superseded by a further advance in which the disc was attached to a large fly-wheel worked at right angles and turned by a crank handle. This gave the potter better control over his clay, enabling him to devote all his energy to the throwing, and giving him the power of regulating the speed by word of mouth to his assistant whose duty it was to turn this wheel. And lastly came the addition of steam and the invention of the conical drum, enabling the potter himself to regulate the speed of his wheel by the mere pressure of his own foot. Thus, while the modes of turning the wheel have changed, the wheel itself remains the same as in the days of the prophet Jeremiah, whose description of the potter and his work is so graphically given in his denunciation of the children of Israel. I have mentioned the wheel thus fully as it is and always will be the means by which the potter does his principal work. The dexterity and skill with which a good potter can throw his work constitutes his art, and I trust the day will never arrive when the wheel is superseded by the mould in the formation of circular work. The mould reduces everything to the one dead mechanical level, while the wheel brings out the powers and the individuality of the workman.

Clay, of all substances, is that which lies most readily to hand, and could not but be found most available for an infinite number of objects of first necessity; its use, however, was progressive, and the bound from the rude vessel of the savage to the exquisite Etruscan vase,—from the bricks of Babel to the beautiful terra-cottas of Germany and Northern Italy,—is as great as is the period of time that divides them. The uses to which pottery is put have extended much of late years, and will no doubt continue to extend; at the present moment there is scarcely a trade which does not, more or less, call upon the potter for help. People always build with the material most readily to hand, and thus it came to pass that in the early history of man, with forests almost untouched, and a necessity to clear the same for the cultivation of the ground, wood was universally used, as in many parts of Russia, Norway, Sweden, &c.; but as these became exhausted, or more permanent dwellings were required, wood gave place to clay, to stone, and even to iron, affording in their preparation alone, employment to a vast multitude of workers, making the building trade the most important in all countries. As civilisation increased dwellings became more luxurious, until, at the present time, the providing of this necessity finds one of the chief occupations of man. It would be very interesting, did time permit, to trace the steady growth of the builder's art; how, from the mud hut or from the mere protection formed by boughs, we have come to the magnificent structures of the present day, replete with every comfort and demanding the utmost amount of care, thought, energy, and skill in erecting, the hall in which we now are being an example of this.

Of all trades that of the builder has, perhaps, benefited the most by the extended use of clay. It seems but a few years since the introduction of stoneware drain-pipes, and, though at first looked upon as a great innovation, meeting with much opposition, their use has become so general that our firm alone makes about 1,200 to 1,500 miles annually; and now, step by step, terra-cotta appears to be advancing into public favour, buildings in which it is used springing up in all parts of the country. While, in its literal meaning, terra-cotta, as I have already remarked, embraces every kind of pottery, it has now come to be applied exclusively to that class of ware used in the construction of buildings which is more or less ornamental and of a higher class than ordinary bricks, demanding more care in the choice and manipulation of the clay and much harder firing, and being, consequently, more durable and better fitted for moulded and modelled work.

It is always necessary that those desirous of using any particular material should be thoroughly acquainted with its characteristics. Were this always the case it would save a great amount of disappointment, and potters would never be expected to do impossibilities. An eminent architect has described terra-cotta as the highest development of bricks; its place certainly seems most appropriate in conjunction with brick, and in this form it has been most successfully applied. I have known buildings of stone in which terra-cotta has been introduced, but only in the ornamental parts, and principally on the score of economy. To understand a material thoroughly, its characteristics and nature should be studied and all its peculiarities known. I would, therefore, draw your attention to the mode of manufacturing terra-cotta.

All clays require careful preparation before use, and their after characteristics are often as much determined by this as by anything; the same clay being different under different treatment. The first necessity is that of kneading,

or, as it is termed, pugging. This consists of well mixing the clay and reducing it to a perfect consistency throughout; originally this was done by men treading it out with their feet (much in the same way as we read that the juice was pressed from the grapes in primitive times), but now pugging-mills are used, through which the clay is passed and thoroughly mixed. Most clays, like gold itself, require an alloy to make them more workable. In a pure state they are often what is termed too fat; their shrinkage is too great, and they are liable to twist and warp in drying and burning; rough stuff or burned clay ground fine is, therefore, added in proper quantities to prevent this, and to give the potter a more certain command over the clay: thus mixed, it is raised in a dry state into the mixers, and with the necessary addition of water it is passed in through the pug-mills ready for use. In some particular instances the clay is wedged or barred; that is, made more homogeneous by being continually struck with an iron bar, or by being cut with a wire, and the two separated pieces violently struck together: this tends the more thoroughly to assimilate the parts and to expel any imprisoned air. The clay being thus prepared, is pressed into a mould with considerable care, to prevent, as in the case of pugging and wedging, any accumulation of air in the clay; for should this occur, the heat of the kiln expanding the air will completely shatter the work. The moulds are of plaster, being taken from the models in the usual way; care is also necessary that in pressing into the mould an equal thickness should be kept throughout, as without this there would be uneven shrinkage, the result of which would be distortion. It is not safe to make any blocks of solid clay much more than 1 in. thick; to meet this difficulty, when work is required of a greater thickness the blocks are formed hollow with cross webs to strengthen them; when necessary these cavities are filled with concrete: this filling also prevents the accumulation of moisture to which the blocks would be liable were they left open. The use of moulds, of course, applies more especially to all repetitive work, such as string-courses, mullions, plinths, cappings, cornices, balusters, &c., but it often happens that only one or two pieces of a particular kind are needed. These are then formed by hand, without the help of a mould, and at once passed through the kiln. This is particularly the case with sculpture, to which I shall allude presently. The last process is that of drying and burning, both of which form a very critical stage. Drying is the exhaustion of the water by evaporation, which must be done very gradually and very evenly, otherwise there would be a liability to crack and twist. The burning is the mysterious process and is of the utmost importance, as on it depends the lasting qualities of the material, for if the terra-cotta is well burned it will last for all time. An eminent American geologist, whom I knew personally, being asked what the burning was, replied simply expelling moisture from clay; but it is more than this, otherwise sun-burned pottery would be as good as any other. The fact is, chemical action goes on in the firing which changes the whole nature of the clay. It is no longer plastic, but rigid, and when once burned never admits of being worked up again, as in its original state. To accomplish the burning successfully requires much experience, much skill, and much patience. Kilns themselves often differ materially, and require to be known to avoid failure. In this as in everything, knowledge may be gained in three ways,—by reading, by hearsay, by experience, but the last-named is of the greatest importance. The burner, to be successful, must know his kilns thoroughly, but besides the kilns the clays have to be studied, and when we remember that the same bed of clay will sometimes change in character, and be differently affected by the application of heat, you will readily understand some of the difficulties with which the potter has to contend. A practical potter, speaking of this subject of burning, once said:—"I can only add, after twenty years' experience,—not that I know less than I did fifteen or twenty years ago, but rather how little I know compared with what still remains to be learned about burning." I am aware that some people have thought the potter's an easy trade to learn; but many have lived long enough to alter their opinion, having found by bitter experience that, even in the manufacture of pottery, there is no royal road to success. I once heard it said of a person who, without any previous knowledge of pottery, had gone into the business, that he had affirmed that after a twelvemonth at the work he had mastered it in all its details: this is not the experience of those who have spent a lifetime at it, as my previous quotation from the speech of a practical potter testifies. Need I add that the place of this gentleman knows him now no more? He has accomplished a forced retirement. There is no doubt, however, that the potter's is a very seductive business, and one may be led on and on in the endeavour to attain an end at a very heavy cost; but, on the other hand, it is the only way of ultimate success. Amongst Wedgwood's papers were found trials numbering many thousands to obtain one result; and who has not heard of Bernard Palissy being so engrossed in attaining his end, that in default of anything better, he burned up his furniture, to his wife's dismay, that he might obtain fuel necessary for the firing of his kilns.

Having thus described some of the difficulties of the manufacture, I now turn to some of the advantages in the use of terra-cotta as a building material; and, first, I would mention its durability. It is, in fact, the only substance that may be said to be imperishable. Stone of every kind disintegrates by time, but well-burned clay resists all. There is terra-cotta at present in existence that has defied the work of time for thousands of years. From Egypt, Persia, Syria, Mesopotamia, Nineveh, Babylon, and the far East, have come to us pottery the age of which is past computing. Dr. Schliemann not long since brought to light some wonderful specimens; but a visit to the British Museum will surely convince the most sceptical: here may be seen slabs of burned clay which date not tens, nor hundreds, but thousands of years ago, covered with delicate writings, showing as clearly as the first day they left the operator's hands. To these slabs we are indebted for almost all we know of prehistoric time. In Greece and Italy pottery is continually being found of ancient date, and it was only since 1873 that those beautiful Tanagra figures were first brought to light, which have resisted the work of time for upwards of 2,000 years, having been made about 350 years before Christ; while some of the finest examples of Greek terra-cottas date back 100 years previously to this.

Turning to more recent times, we have the terra-cottas of Northern Italy and Germany, the former of which have been so well described and beautifully illustrated by Lewis Grüner in his work entitled "Terra-Cotta Architecture of North Italy." Most of these structures date back to the twelfth century, and in one instance, at all events, that of the Church of San Pietro in Ciel d'Oro as far as the seventh century; the study of this work, which shows also many examples of colour, would well repay any one desirous of knowing more of this beautiful material. Throughout the plains of Lombardy, and in many parts of Germany, stone is rare, and there, buildings of considerable importance have been erected in which clay has been moulded into such exquisite forms as to raise it into a material of both value and dignity.

Many examples of brick buildings with terra-cotta mouldings and ornaments exist in England, having been erected mostly between the thirteenth and fourteenth centuries. Generally the use of terra-cotta died out in this country with the Tudors, and, except a slight revival of moulded brickwork about the seventeenth and the beginning of the eighteenth century, architectural terra-cotta was not practised until the time of George III. Wedgwood attempted a revival, but was not successful. Examples of this earlier period are found at Sutton-place, in Surrey, and at East Ham, and, later still, some medallions at the Hampton Court Palace, all of which are in excellent states of preservation. Among other specimens of terra-cotta building may be mentioned Eastbury Manor House, between Barking and Ilford, and Layer Marney Towers, near Colchester, Essex (the latter being illustrated in the last and present number of the *Builder*).

[At this stage of the lecture a pause was made for the purpose of exhibiting the mode of working the potter's wheel, which was illustrated by Mr. Butler showing the method of ornamenting the work.]

Towards the close of the last century there was a partial revival in the use of terra-cotta resulting in the establishment of a manufactory in Pedlar's Acre, Lambeth, under the management of a lady named Coade. From this factory was turned out much good work, which found its way into all parts of the country as well as in London. The frieze at the Italian Opera House in the Haymarket, the caryatides and other ornamental work in St. Pancras Church, are from this factory. On the top of the Exchange at Liverpool is a colossal figure of Britannia, also made by Coade nearly a century since, which, notwithstanding its exposed position, retains its original sharpness; some time ago it was proposed to paint it, but this was abandoned as being unnecessary. While staying myself with a friend in the Vale of Clwydd, I came across some excellent specimens of terra cotta, which, by much research, I found had been exposed for nearly 100 years at the least; they had formed part of Lleweni Hall, a mansion built by the Salisburys, a print of which I have seen showing the terra-cotta ornaments, many of which are about the grounds, and some bearing the name very distinctly of "Coade, Lambeth." In the early part of the present century the mansion was destroyed by fire and never restored; portions, however, which were left were converted into farm homesteads, and it was in them that there were to be seen many relics of the terra cotta, one of which,—a medallion of one of the seasons,—I was able, through the kindness of the agent, to bring away with me. It was as sharp as the day it was first made. I am sorry I could not find the piece itself to show you (I exhibit a facsimile of it). The print to which I have alluded was published by Boydell, of Cheapside, and was dated 1792. In it was shown a fountain surmounted by the figure of Neptune; it was this figure that I found in the garden of one of the farms, and on which was the name "Coade, Lambeth." In Bishopsgate-street, in a niche outside Crosby Hall is a terra-cotta figure of Sir Richard Crosby made by us more than fifty years ago, and which shows not the slightest signs of decay. It has been painted of late years,—not, however, for the purposes of preservation, but only for decoration. I think you will agree with me that fifty years in the atmosphere of London is far more trying than 100 years in the Welsh valley. The atmosphere of our large towns and populous districts is very destructive to stone and iron, from the smoke given out by the increasing consumption of coal, or from the fumes of chemical and other manufactories; but the close texture of well-burned terra-cotta makes it a very reliable material under these circumstances. I would mention one instance which came under my own notice some time since, and which, no doubt, may be seen at the present time. At Buckingham Palace, about thirty years ago, to that part adjoining the stables were placed several large vases, made by the late Mr. Blashfield. These are in perfect preservation, while the York stone coping on which they stand is in a state of decay. Bath stone is even less reliable; for, notwithstanding the care bestowed upon the choice of the stone, the Houses of Parliament in Westminster are constantly needing extensive restorations. I once was called to see a balustrade on some terraces of a mansion, near Luton, where the balusters had worn down to a thread, by the mere silent action of the atmosphere, and that far removed from any town; while at the church at the top of Langham-place, London, the balustrading and cornice became so decomposed and shattered by the weather that a large portion fell, narrowly escaping some people below. But metal itself is not proof against the atmosphere of London; for the panels and lions at the Nelson Monument, Trafalgar-square, have long since shown signs of decay. It is only fair, however, to mention that some terra-cotta has been made which, from defective burning, is of a very inferior character, disintegrating shortly after exposure. In such the heat applied has not been sufficient to effect the necessary chemical change which gives to terra-cotta its indestructible character.

Good terra-cotta is easily tested; when struck with steel it should emit sparks and merely show a black line, and ring like a bell. Sir Charles Lyell in his "Antiquity of Man" (chap. iii.) bears remarkable testimony to the wonderful durability of clay, which I cannot do better than quote in concluding this part of my subject. He says:—

"In the vast changes this planet has undergone, few things remain to mark the arts of its earliest inhabitants. Flints, spearheads, arrowheads, fragments of iron, of bronze, of pottery, are almost all that remain. Of the latter burned bricks, jars, vases, the human figure in

burned clay, are found in the remains of submerged towns, in the channels of the Nile and in Upper Egypt, in the Mexican buried ruins of America, and elsewhere, as the enduring types of civilisation of peoples and races whose names even are not known in the pages of history. Granite disintegrates and crumbles into particles of mica, quartz, and felspar, marble soon moulders into dust of carbonate of lime, but hard-burned clay endures for ever in the ancient landmarks of mankind."

My next point is that of strength, and, as in the matter of durability, I was able to give you actual examples of the power of terra-cotta, so I can also with regard to its strength. As already mentioned, terra-cotta for building purposes is generally made of hollow blocks formed with webs inside, so as give extra strength, and keep the work true while drying. This is necessitated because good well-burned terra-cotta cannot safely be made of more than about 1 in. in thickness, whereas, when required to bond with brickwork, it must be at least 4½ in. thick. When extra strength is needed these hollow spaces are filled with concrete, mixed rather weak, as otherwise the cement is liable to swell and burst the terra-cotta. Terra-cotta alone is able to bear a very heavy crushing weight, but thus strengthened its powers are much increased. Some years ago I had occasion to test a block of terra-cotta about 1 ft. cube, but without any cross webs or concrete filling to strengthen it. At 40 tons it splintered at the edges, and at 100 tons it became generally broken but not crushed, for I was able by tying it up with string, before releasing it from the jaws of the hydraulic press, to preserve it in its original shape. This very block I am able to show, though the experiment was made about ten years ago.

The late Mr. Blashfield, at the request of Mr. Charles Barry, and to illustrate a paper on the subject of terra-cotta, read before the Royal Institute of British Architects, prepared an exhaustive series of experiments giving the strength of terra-cotta, the result of which showed that as a building material it greatly exceeded all others in ordinary use, comparing most favourably with Portland, Bath, and ordinary stock bricks. Each specimen was placed between two pieces of ¼-in. pine slabs, and the pressure then applied.

The result of these trials was published in a tabulated form in the Proceedings of the Institute of British Architects at the time they were made, and a few comparative tests will be sufficient for the present occasion.

A block of Portland about 6 in. by 6 in. by 6 in. bore a crushing weight equal per foot super. of	292 tons.
A block of Bath of similar dimensions	104 ,,
A stock brick	82 ,,
A similar solid block of terra-cotta	523 ,,
A hollow block, slightly made, and unfilled	80 ,,
The same, but filled with concrete	163 ,,
A hollow block unfilled, but made with thicker walls	186 ,,

These figures are ample to show the correctness of my statement.

Terra-cotta possesses another element of strength, which is not shared either by stone or iron, but which is most important, that of resisting the action of fire. Heat, which would destroy stone, has merely the effect of burning off the dirt from the terra-cotta, giving it the appearances of having just left the kiln. This was exemplified at our own building a short time since. After the late fire there, which, though of short duration was terrifically fierce, on examination the sills of windows and copings of walls which were of stone were destroyed, but the dressings to windows which were of terra-cotta were perfectly sound, the great heat merely brightening them up and making them look like new.

This power of resisting heat has been turned to advantage by the introduction of a patent fire-proof flooring, called the "Doulton-Peto," samples of which I have near me. The principle consists of a series of hollow blocks of fire-proof material, which, placed between the rolled iron joists, make a flat ceiling, and which may be plastered or not. The blocks next to the iron joists have flanges, which protect the joists from the fire and which form a perfect key for the plaster. We have subjected this flooring to very severe tests with great success. With a weight equal to about 7 cwt. to the foot sup. on a floor of 50 ft. sup. we have lighted a fire beneath, making it red-hot in parts, and, while in this state, have turned on a hose with a considerable pressure of water, but without the least effect. It has also been tested with unevenly-distributed weights and with vibration and concussion, all of which it has successfully withstood. This flooring is used throughout at the London Pavilion, where it was found very advantageous from its lightness, the speed with which it was constructed, and its cleanliness. One of our own factories is also floored with it, where it may be seen by any one interested in the use of fireproof construction.*

The third advantage I would bring under your notice is that of economy, and this is of the utmost importance in the present times, and, perhaps, more than anything else tends to popularise terra-cotta.

In comparison with good stone, while being much more durable and possessing more strengh, it is also much cheaper, and I have known the use of terra-cotta to be most helpful to architects, enabling them to carry out their designs in their entirety. You can readily understand how this is in repetitive work; the model once made, the pressing into the mould is a labour which may be repeated as often as required, and at comparatively small cost.

The actual cost of terra-cotta as compared with stone varies according to the class of work and the quantity of repetition. The more elaborate the design the greater advantage will there be in the use of terra-cotta; in some instances as much as one-third less is saved. But even in cases where there is repetition, it may be by good management cheaper than stone. We once carried out a work in which were a number of capitals to columns, all of which were to be different. To accomplish this economically we cast the bell, dressing each one with a different ornament; you will readily understand the economy effected when you remember how much easier it would be to form all such ornaments in the soft plastic clay than to carve them in the hard stone.

This is especially so in the case of sculpture, and I cannot help thinking the day will soon arrive when terra-cotta will be much more used for monumental purposes than it is. Mr. John Bell, the eminent sculptor, has expressed himself very favourably on this score. I well remember his describing to me the immense labour attendant on his executing the colossal group of America at the Albert Memorial, and the method pursued was what is always done in all sculpture. The work is modelled first in clay, and, when finished, a waste mould is taken of it and the stone is carved from this, the finishing touch being done by the sculptor himself, and should it be necessary to carry the work out in bronze, or any repetition needed, a further piece mould would have to be taken, whereas should the work be done in terra-cotta, the first model made in the clay would be burned, and all after labour would be saved. I am aware that this process is attended with some risk, for should any accident happen to it in the burning the work would have to be remodelled, neither could such a method be carried out by the sculptor alone. It must be done in conjunction with the potter, who knowing the difficulties of burning, would carefully select the clay and see that the thicknesses throughout were as even as possible. Beautiful pieces of sculpture have often been ruined in the burning by neglecting this principle.

The largest piece of sculpture that has ever been executed in terra-cotta was Mr. John Bell's group of America at the Albert Memorial, which was manufactured in 1876; and some idea may be formed of the difficulty of the work when I tell you that it consists of five figures each about 10 ft. high, with a buffalo of like proportion in the centre, each figure being in a single piece. This group was sent to the Philadelphia Exhibition, where it was accorded the post of honour, and is now at the Smithsonian Institute, Washington.

Mr. Tinworth, whose studies from Scripture are so well known, rarely moulds his work; but by finishing up the subjects at once in clay, they are then burned, such never being repeated. His work is mostly in very high relief, his method being to make small sketches like those I have here, and from such to model to the size required. Some photographs here represent many of Mr. Tinworth's panels.

Another source of economy is its lightness in comparison with stone, by which means a saving is effected in carriage and handling; and as the filling of the blocks may be done with the broken bricks lying about, the expense of carting away this rubbish is avoided.

The absolute cost of terra-cotta in comparison with stone varies not only with the class of work but with the locality; if in a district where stone abounds it would not be so advantageous. In London it would be on an average, say 20 per cent. less than Bath, and 40 per cent. less than Portland.

Another advantage it possesses is that of colour. In stone of all kinds except marbles, there is always one uniform tone, whereas in terra-cotta the colour varies, giving an appearance of depth to the work, and producing very pleasing effects.

This variety of colouring is generally produced by the flash of the fire; and its beauty of appearance can best be obtained in this way.

The natural colours of terra-cotta are the buff, the red, and the blue, these colours being more or less intensified by the amount of heat to which they are subjected. Other colours are obtained only by the admixture of foreign matter.

While thus speaking of the advantages of terra cotta, I would not have you imagine there are no attendant disadvantages or difficulties; the difficulties I have already mentioned being occasioned chiefly by the nature of clay, in the varying effects produced by the action of fire, and the care under these circumstances required to keep the ware from cracks, warps, and twists. The disadvantages in the use of terra cotta are neither numerous nor insuperable.

As I have already observed, there is the difficulty of getting the blocks true, but this is a matter mainly for the manufacturer; at the same time, much rests with the architect in designing his work so as to be suitable to the material. But the great difficulty is on the score of the extra time required to prepare the necessary drawings, one set for the builder, and another to the shrinkage scale for the manufacturer. But makers now are generally willing to undertake the latter work themselves, the full-sized drawings being all that are necessary.

There are also risks to be run. After all the labour has been spent upon the work, the fire, which is said to try all men's work, may find out some defect in the making and render it useless; to guard against this much care is necessary throughout all the various stages, and generally a few pieces more made than are absolutely required.

This brings me to that greatest of all troubles, the time needed in manufacture, and to combat this, I cannot do better than quote the words of Mr. Charles Barry, in the paper to which I have already alluded, and which would point to really an advantage rather than a disadvantage. He says:—

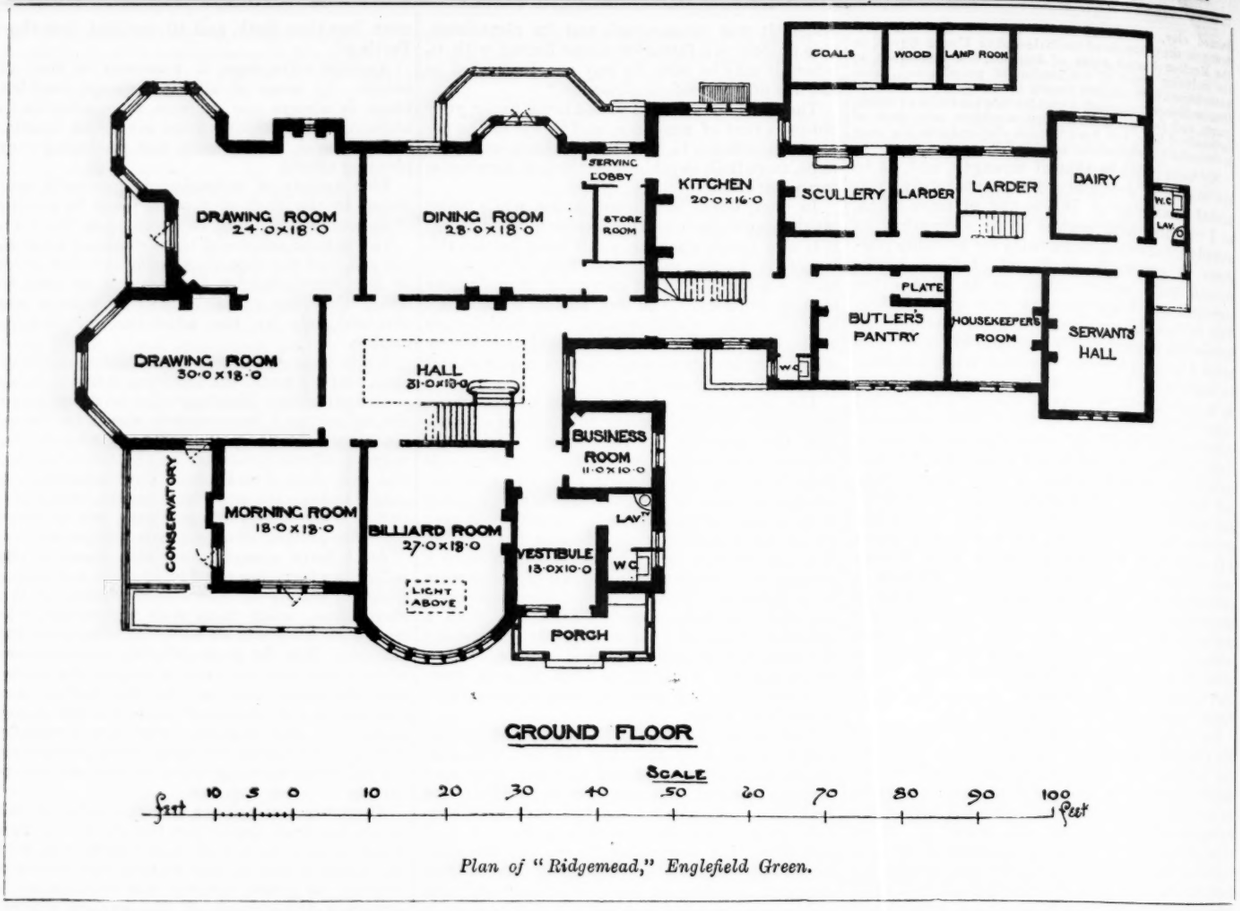
"Of these [that is, the disadvantages] perhaps the most embarrassing is the arrangement necessary to have the terra-cotta blocks made and ready on the ground, before the rest of the work is begun, in order to work in where wanted as the bricklayers progress. At times this is found impossible, and annoying delays in the general work take place, for which clients will be apt to blame their architect. The lesson, of course, to be learned from this is to carefully mature the design at the outset, instead of contenting ourselves, as we now often do, with a mere sketch of what is intended, with the hope and intention of working in parts as time goes on and the work proceeds. I am not sure that architects ought to object to this, since it must produce decision of thought and precision of detail, which may be an advantage in an educational point of view, and is a serious corrective to indolence of thought in design."

Terra-cotta has been objected to on account of its retaining its original colour, and not being toned down as much as other materials by age. Again let me quote from the words given by one of the profession:—"If a design requires age before its beauty becomes apparent, it surely needs re-consideration." But this objection no doubt arose from the fact that at one time it was considered that terra-cotta should be like stone, very even in its colour, whereas one of its greatest beauties, and certainly a distinctive feature, are those slight variations of colour which form its most charming characteristics.

To obviate the risk of warping, every block should be kept within reasonable limits, and large pieces only used where absolutely necessary. Large blocks may indeed be made, but it is very difficult, and the cost of manufacture is thereby considerably increased. In those beautiful examples which I have already mentioned which occur in Northern Italy, and which were erected from the seventh to the thirteenth centuries, brick dimensions are as much as possible adhered to. It is often absolutely necessary to make blocks of large dimensions, but when this is so, a corresponding time should be allowed in their manufacture,—indeed, we have made cornices, &c., of great size, and at the present moment are engaged upon some columns about 10 ft. high, of which one portion of the shaft alone is 5 ft. long.

Some time ago the use of terra-cotta steps

* For section of this system of flooring see *Builder* for December 19 last, p. 877.



Plan of "Ridgemead," Englefield Green.

was much advocated, especially in buildings erected by the London School Board. Knowing the unreliable nature of the material for such a purpose, we always refused to make them, but to meet the case have lately patented a tread of pottery, of great density, which may be used also as a nosing to stone or concrete steps. The Sicilian tread, as it is called, is absolutely indestructible, and does not become slippery by any amount of use. A flight of steps in one of the main galleries at the Exhibition at South Kensington, which has been in use for the last two years, is still as perfect as when first fixed.

A late development of terra-cotta has been in the form of glazed work. Glazed pottery has long been known, but only as applied to vessels, such as plates, vases, &c., or to tile work for the lining of walls, such as the works of Lucca Della Robbia, &c., and the Saracenic mural decorations; but in the present day there have been some few examples of structural glazed pottery. This glazing may be effected in two ways,—by the application of a glaze washed over the ware, or by the action of salt thrown into the fire. Of these by far the most durable is salt-glazed pottery. It is thought by some that the slight smear on many of the Etruscan vases is due to salt glaze. Certain it is that in excavations made in England several articles of Roman origin have been discovered in this ware. It was not known in England till comparatively late years; but, though Germany in her Grès de Flandres and Rhine ware may be considered as the first in the revival of the salt-glazed stoneware, it was reserved for England to carry this art to its present state of perfection, and it is only a laudable pride to say that at the Lambeth pottery Doulton ware, in its successful manufacture, its range of colouring, and variety of design, has far outstripped the Grès de Flandres which suggested it. The latter was limited in colour, design, and application; but the samples here shown testify to the great strides made by the manufacture of what is now known as Doulton ware. Its application to architectural work has only been attempted within the last few years.

The *intense heat* to which it is subjected, and the consequent difficulty of keeping its true shape, make its use in this form very difficult. It is comparatively easy in all thrown ware, which, from its circular form, shrinks evenly in all its parts, as may be seen in these vases and pedestals. But in all moulded work the difficulties are immensely increased, the liability to warp and twist requiring increasing care in all its stages.

That this is not impossible, however, is proved by a work we carried out some short time since, where every portion was salt-glazed stoneware. The vestibule of the Palsgrave,—a public building in the Strand opposite to the New Courts of Justice,—is a triumph of patience and skill, and shows how successfully this salt-glazed ornamental stoneware may be used. Mr. Sparke, the principal of the Art School at South Kensington, speaking of this material, says:—

"It comes as an absolutely new application, which it is for the architects of to-day to develope. Such a material if used to touch up a building must be a valuable addition to an architect's resources. With such colours of a soft and rich brilliancy of tone, applicable as they are to every variety of plastic forms: sober, quiet, harmonious, and deep, full of quality, and without any possibility of their ever becoming (even in the hands of inexperienced designers) garish or common; almost any conceivable effect may be produced. The very virtues of this stoneware, which are the results of its greater trials, make it of different application to terra-cotta, as by the greater closeness of texture and the greater heat that must be employed to verify it, a greater risk of warping and cracking is inevitable. This at once indicates its use in small pieces, and in such places where absolute flatness of surface is not indispensable, but under these conditions it may be applied with admirable effect to heighten mouldings, or to panel terra-cotta pilasters; as bases and capitals, especially as shafts to ornamental columns, and as bosses. It is also clear that the disadvantage attached to the use of polished marble for shafts or decorative bosses are completely overcome by the unalterable nature of the new material and the certainty that it will retain its brilliant surface for centuries, without any exfoliation or weathering which too often leaves the most delicate composition without a point of interest, except a regret at its premature decay."

I have thus endeavoured briefly to lay before you some of the advantages accruing from the use of pottery as a building material, both in terra-cotta and stoneware. The necessary cost from the difficulty of manufacture will doubtless limit the latter in its application, but the increasing use of terra-cotta shows its value and popularity, whereas a few years ago one had to search for examples; now they may be found in every part of England and in every style of architecture, from the severe type of work carried out by the Brothers Adam to the picturesque Elizabethan in Early English, not omitting even the Classical.

The durability of terra-cotta, its strength, its economy, its picturesque appearance, will all tend to its extended use. As I have already said, there are difficulties in the way of its universal application, but these are being continually met, and doubtless when the material is more fully understood it will be even more extensively used.

[At the close of the lecture the wheel was again shown, and Mr. Butler, who is one of the principal artists at the Lambeth Potteries, showed his skill in carving shafts of columns, bosses, &c.]

The last of this series of lectures was given on Wednesday last by Mr. Banister Fletcher, M.P., F.R.I.B.A., on "The Influence of Architecture upon Carpentry." The lecture, which was frequently applauded, was illustrated by many drawings and models. A report of it will appear in our next issue.

Illustrations.

RIDGEMEAD, ENGLEFIELD GREEN.

THIS house has been lately built for Mr. A. de M. Mocatta, on the high ground near Cooper's Hill College. It commands very extensive and beautiful views towards the north, and has been so planned that the windows of the principal rooms may have the advantages of outlook, and, at the same time, be not without sun.

The materials are Bracknell red bricks, Bath stone, and Fareham tiles.

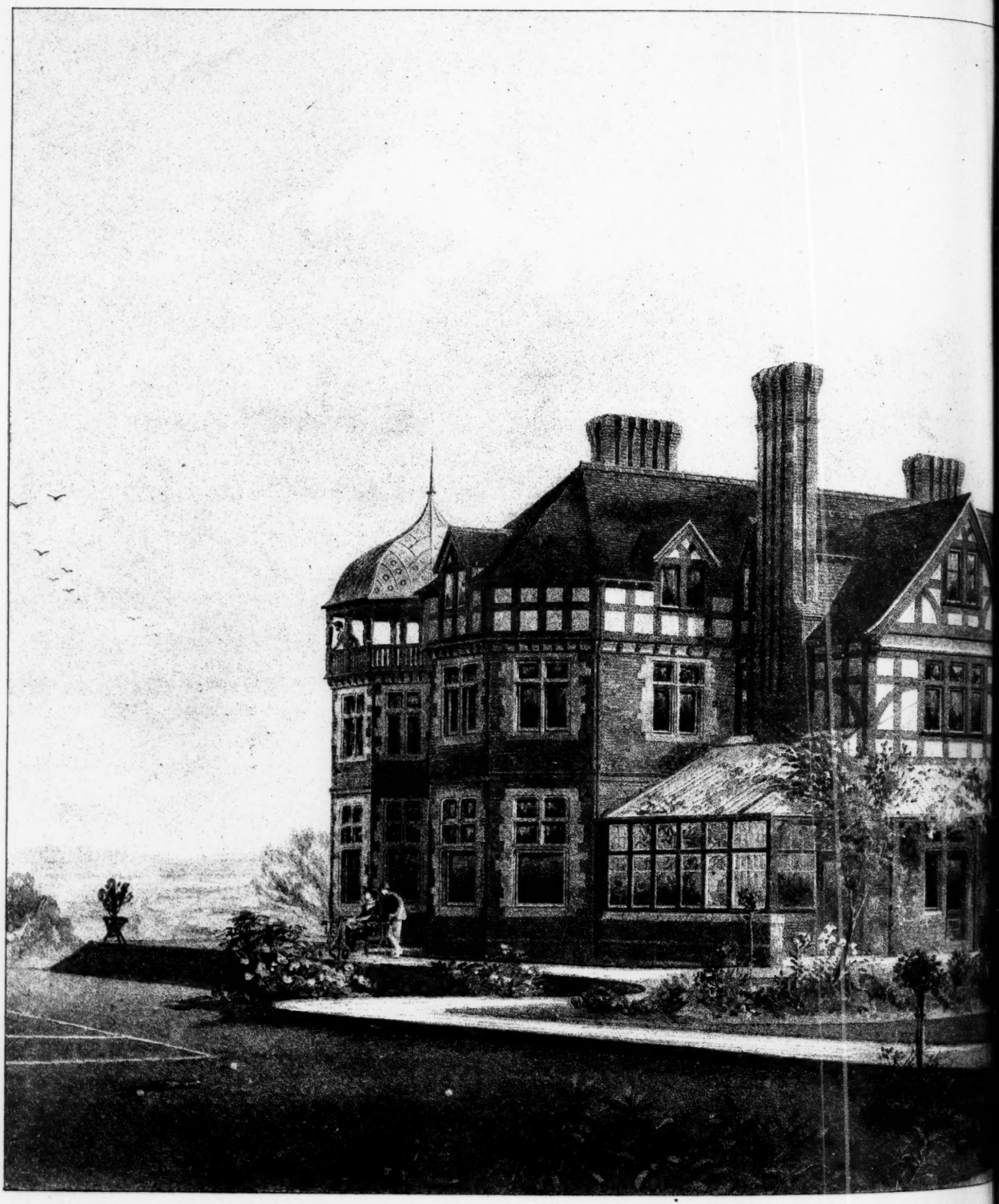
The works have been executed by Mr. Watson, builder, of Ascot, from the designs and under the superintendence of Mr. Henry Cowell Boyes.

FONTAINE D'AMOUR: DESIGN FOR STAINED GLASS.

THIS, a reproduction of the style of Early French Renaissance glass, is one of the windows designed by M. Champigneulle and exhibited by him in the "Exhibition du Travail," held in the Palais d'Industrie at Paris in the autumn of last year, and referred to in our "Letter from Paris" of November 7, 1885. We have previously given another of the windows, "The Return of Alsace and Lorraine," exhibited at the same time and by the same artist.

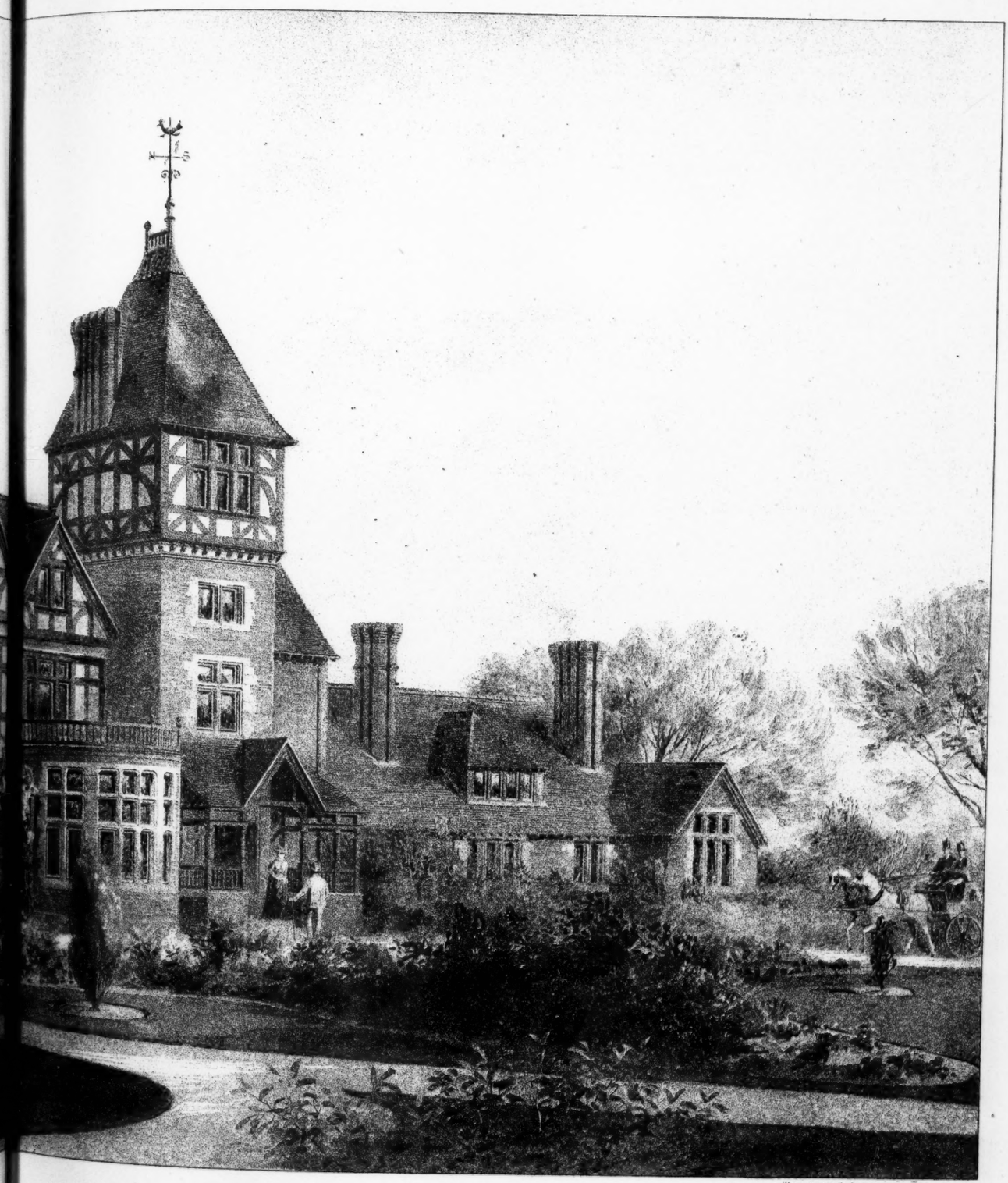
LAYER MARNEY TOWERS.

WE give this week the further measured drawings, made by Mr. A. B. Mitchell, of this interesting building. For a descriptive and historical sketch, see the first article in last week's number.



RIDGEMEAD, EFIE

HENRY COW ES, AR



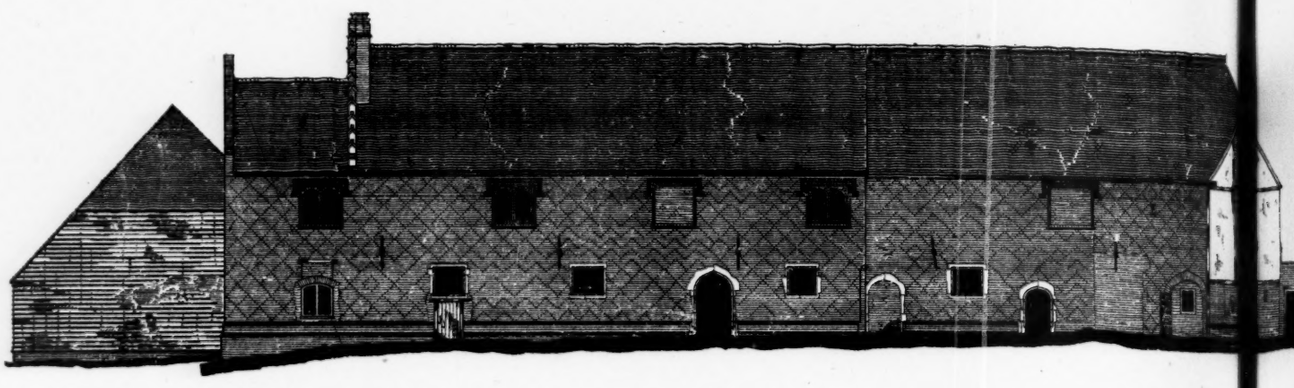
"INK-PHOTO" SPRAGUE & Cº. LONDON.

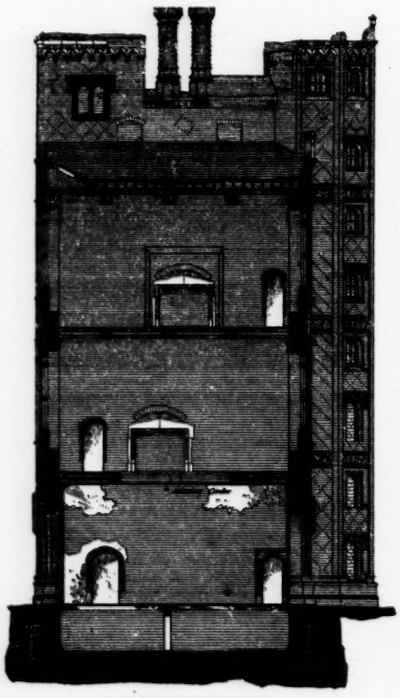
…EFIELD GREEN.

…VES, ARCHITECT

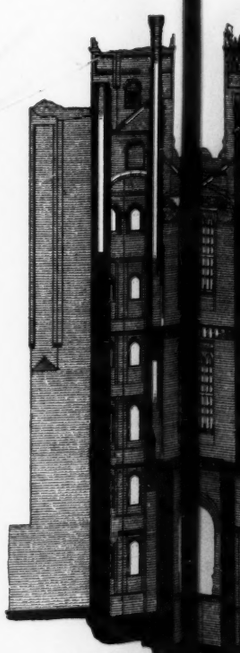
· LAYER · MARNEY · TOWERS · · ESSEX · (1500)

A TYPICAL EXAMPLE OF THE EARLY SIXTEENTH CENTURY
COUNTRY HOUSE STILL IN PART RETAINING ITS ORIGIN… USE ·





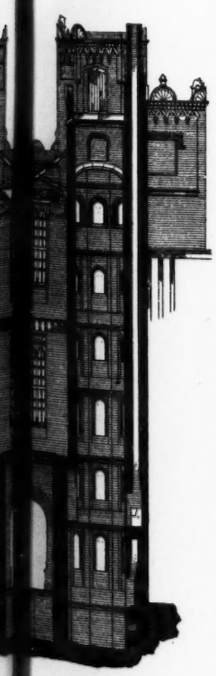
SECTION ON LINE A.B.

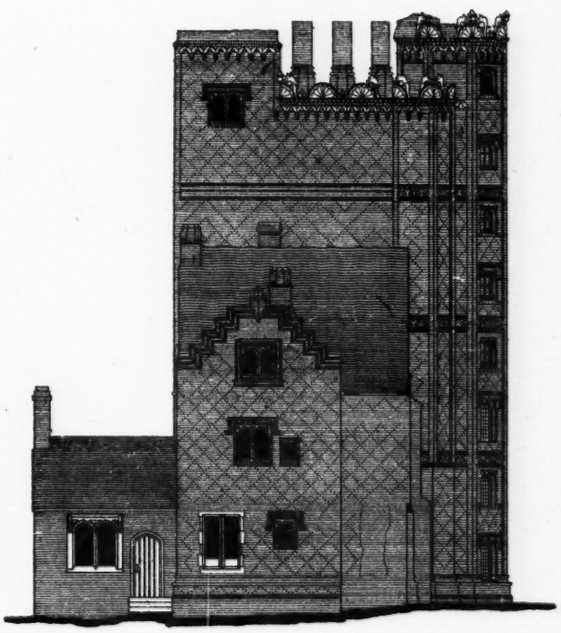


MEASURED AND DRAW… MR. A…

Second Silver Medal, R.I.B.A., 1886.

NORTH ELEVATION

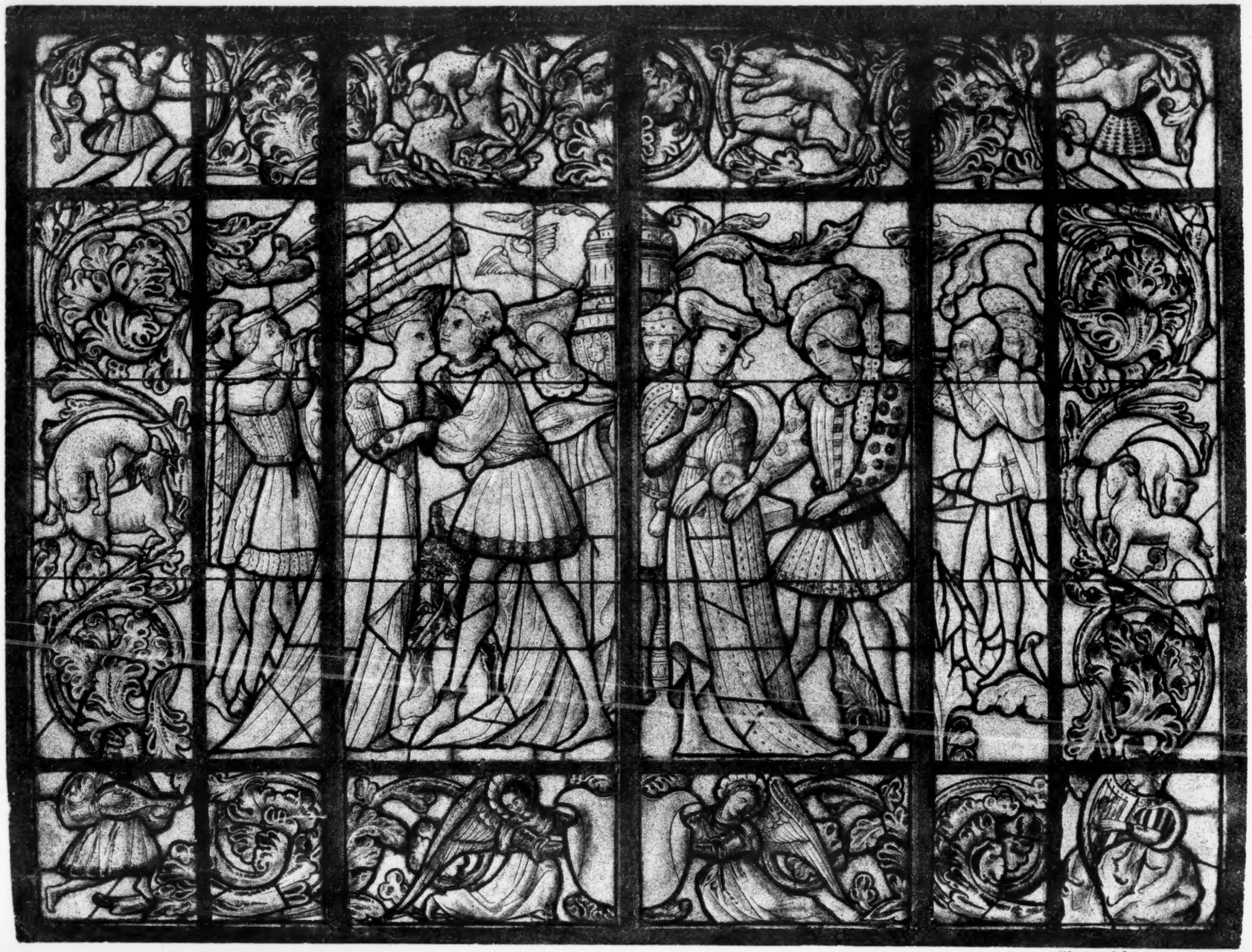




WEST ELEVATION

PHOTO-LITHO. SPRAGUE & Co. LONDON.

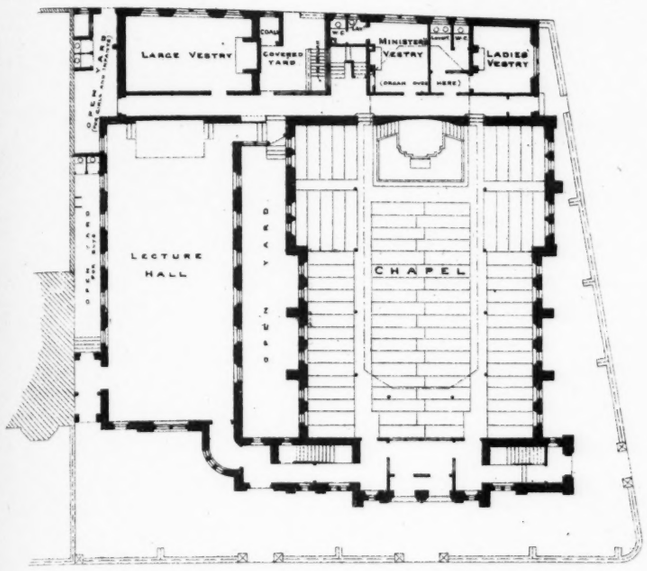
MR. A. B. MITCHELL.



INK PHOTO. SPRAGUE & Co. LONDON.

"FONTAINE D'AMOUR."

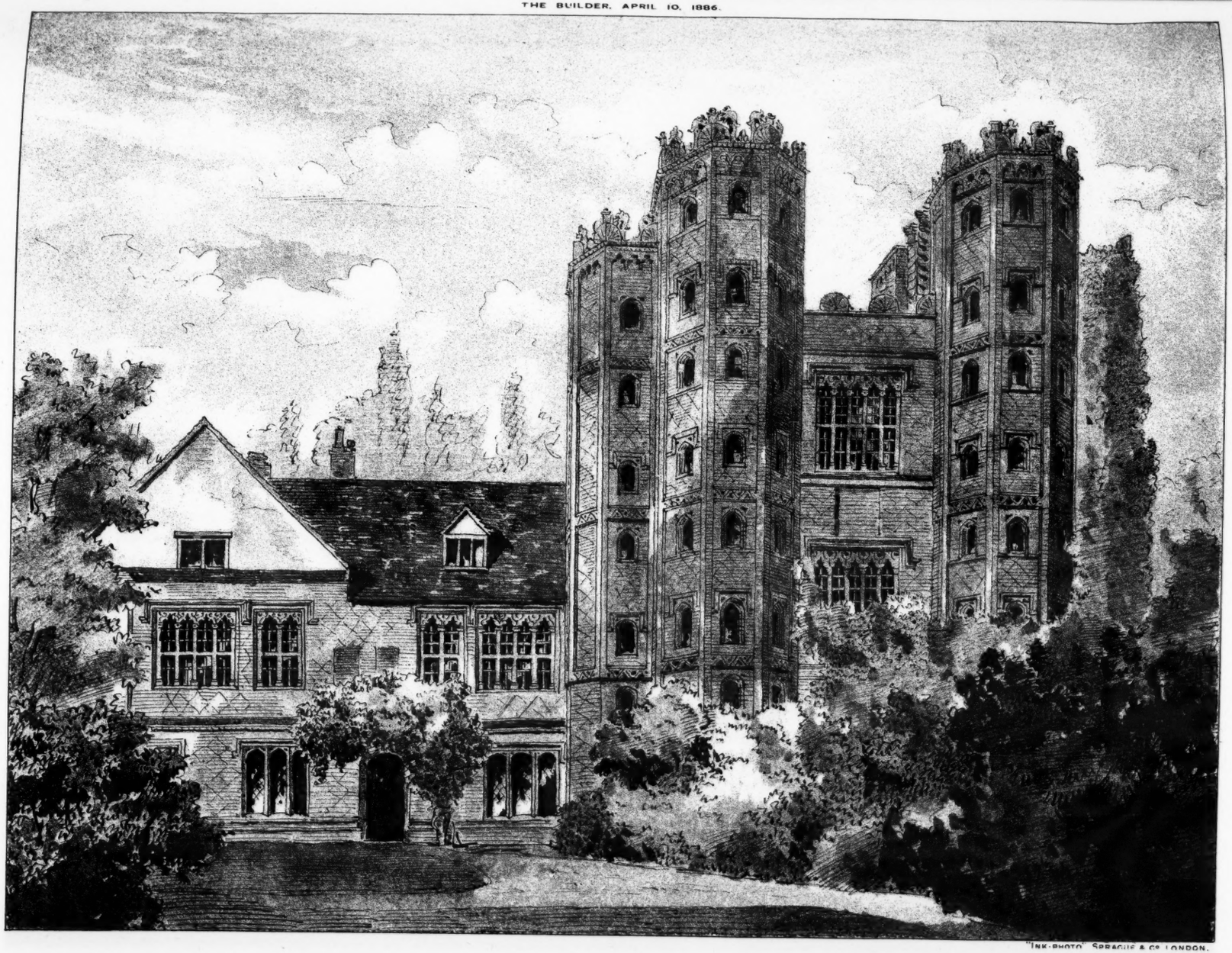
DESIGN FOR STAINED GLASS, BY M. CHAMPIGNEULLE.



"INK-PHOTO". SPRAGUE & Co. LONDON.

BAINBRIDGE MEMORIAL CHAPEL, NEWCASTLE.—MESSRS. S. OSWALD AND SON, ARCHITECTS.

DESIGN FOR STAINED GLASS, BY M. CHAMPIGNEULLE.



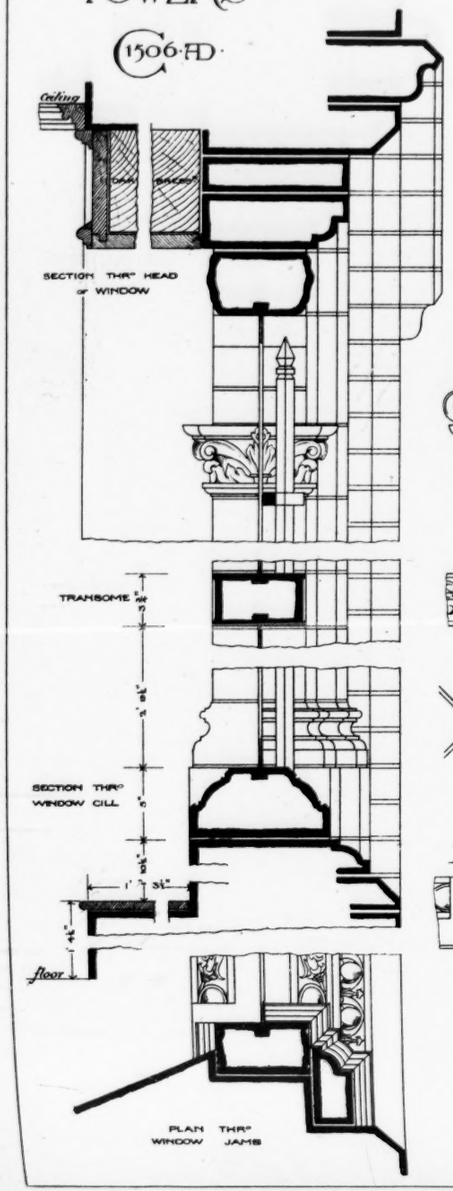
"INK-PHOTO" SPRAGUE & Co. LONDON.

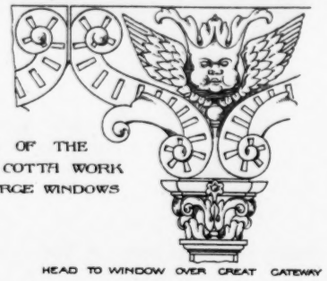
VIEW OF LAYER MARNEY TOWERS.

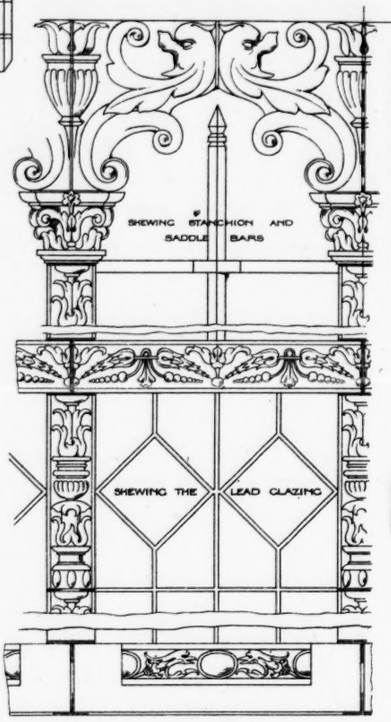
FROM A DRAWING BY MR. A. B. MITCHELL.

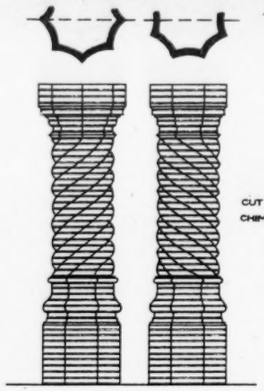
LAYER MARNEY TOWERS

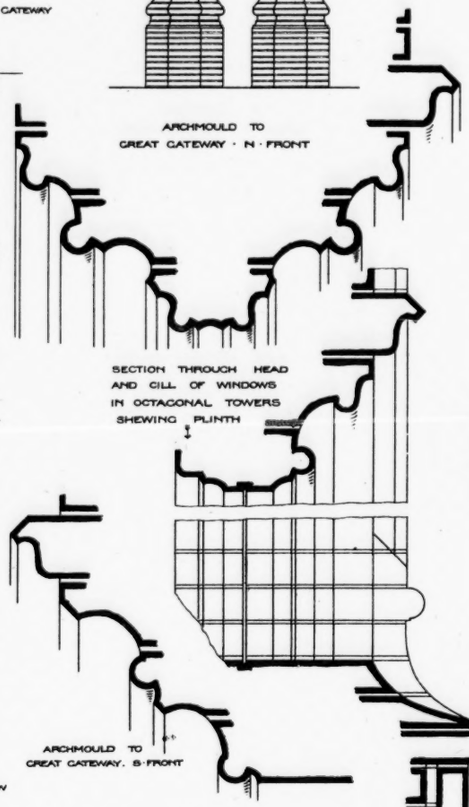
1506 AD

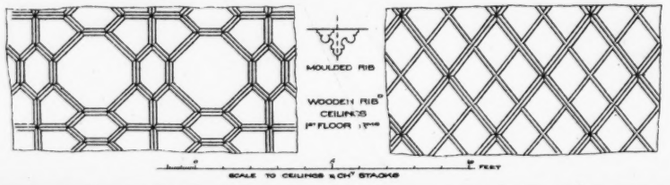


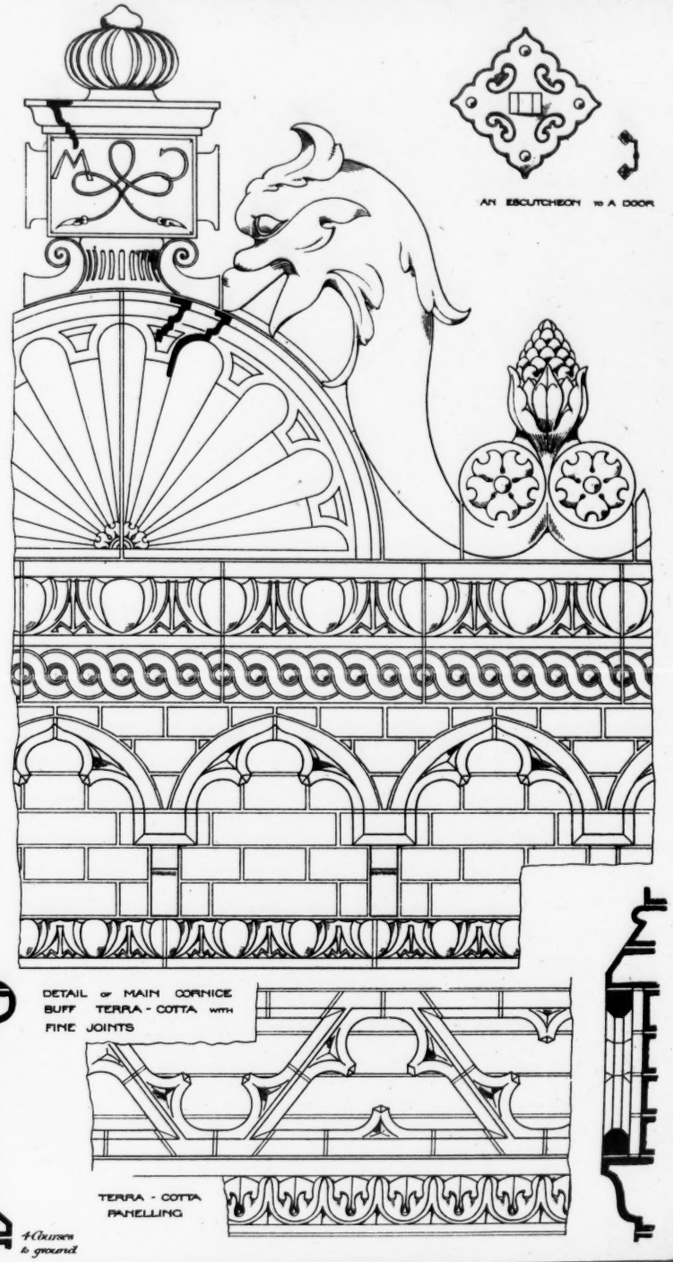







ARCHMOULD TO GREAT GATEWAY · N · FRONT
SECTION THROUGH HEAD AND CILL OF WINDOWS IN OCTAGONAL TOWERS SHEWING PLINTH
ARCHMOULD TO GREAT GATEWAY. S. FRONT



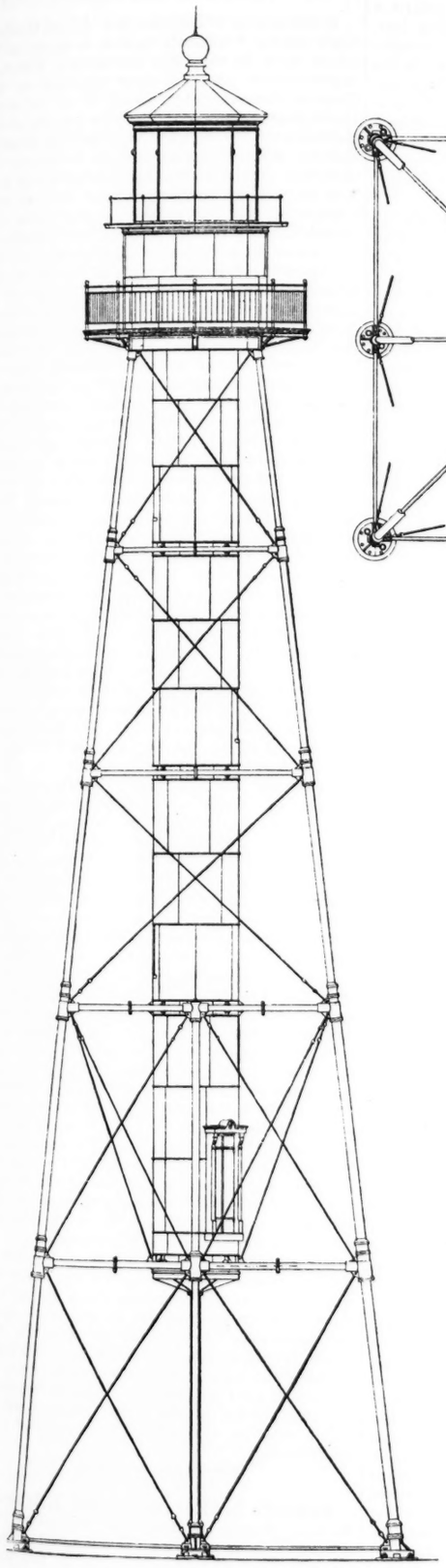

Scale to Details
AN ESCUTCHEON to A DOOR
DETAIL OF MAIN CORNICE BUFF TERRA-COTTA with FINE JOINTS
TERRA-COTTA PANELLING
Returns to ground

Second Silver Medal, R.I.B.A., 1886.

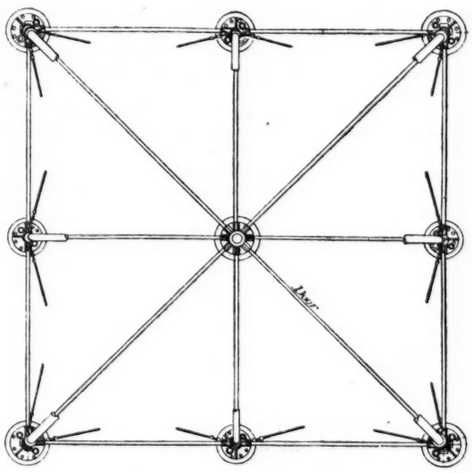
DETAILS, MEASURED AND DRAWN BY MR. A. B. MITCHELL.

PHOTO-LITHO. SPRAGUE & Co. LONDON

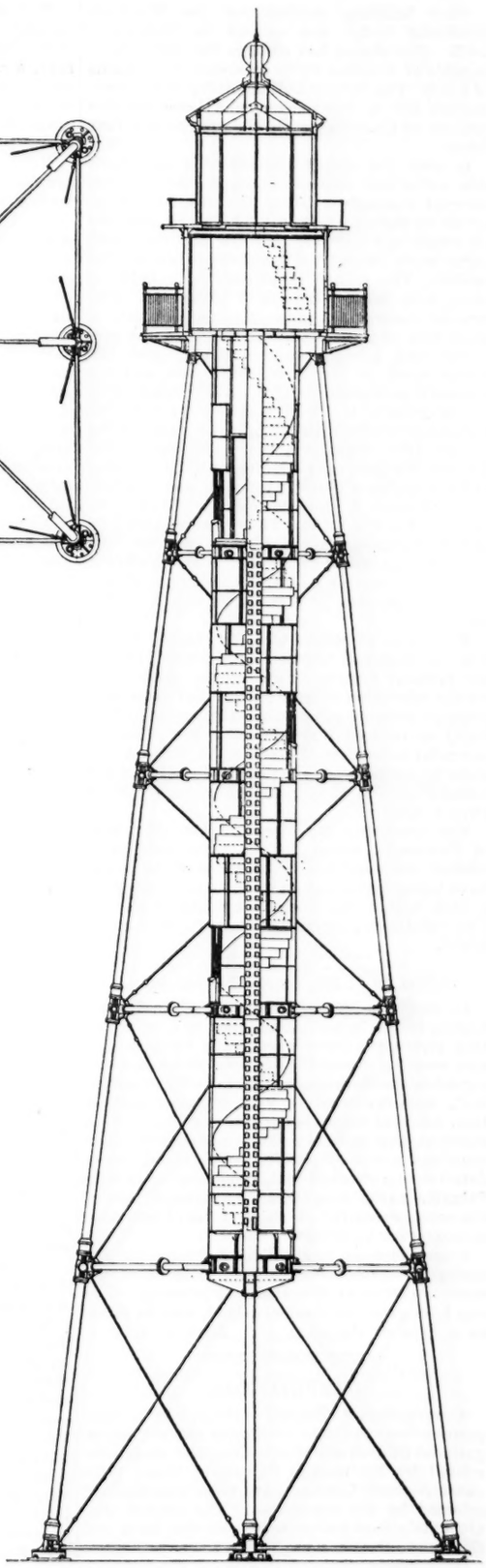
THE BUILDER, APRIL 10, 1886.



Elevation



Plan



Section.

Scale

IRON LIGHTHOUSE, SANIBEL ISLAND, U.S.

"BAINBRIDGE MEMORIAL" CHAPEL, HEATON-ROAD, NEWCASTLE-ON-TYNE.

THIS building, erected for the Wesleyan Methodist body, was opened in November, 1885. The chapel has sittings for 900 adults, capable of increase upon occasions to upwards of 1,000. The lecture-hall adjoining will accommodate 300 to 350 persons, and there are five vestries or class-rooms on the ground and first floors.

In plan the chapel consists of a nave with side aisles and shallow transepts, the extreme internal dimensions being 98 ft. by 55 ft. 6 in. by 40 ft. high to ceiling. There are galleries all round the interior, that for the choir and organ being behind the platform in an apsidal recess. The edifice is substantially built of stone, with internal fittings of pitch-pine. The general contractors were Messrs. Greason & Stockdale, of Gateshead, who executed the carpenter and joiner's work, and entrusted the mason work to Mr. T. H. Hutchison, and the ironwork to Messrs. Bainbridge & Crimson, also of Gateshead; the lead glazier's work to the Gateshead Stained Glass Company; the slating to Mr. John Hewitson, the plastering to Mr. Thomas Wallace, the plumbing to Mr. R. Herron, and the ordinary glazing, painting, and varnishing to Messrs. A. Robertson & Son, all of Newcastle. The gas-fittings have been supplied by Messrs. T. Thomason & Co., of Manchester; the lightning conductor by Messrs. Henry Walker & Son, of Newcastle; and the warming and ventilating apparatus by Messrs. Dinning & Cooke, Newcastle.

The clerk of works was Mr. James Grant. The buildings are warmed by hot water on the low-pressure system, arrangements being made for the admission of fresh air warmed by passing through coils of pipes, while the tower (90 ft. high) is utilised for ventilation and forms a powerful extracting-shaft for the vitiated air; tests by anemometer showing that the air of the interior of the chapel can be changed every twenty minutes.

The architects are Messrs. S. Oswald & Son, of Newcastle, whose designs were selected in limited competition, and the whole of the works have been carried out under their supervision at a cost within the contract amount of 4,956*l*. The total cost, including site, &c., was about 6,500*l*.

LIGHTHOUSE, SANIBEL ISLAND.

IN many places round the coast of the United States, in the large inland lakes, and in important rivers, the Government have built and are now erecting many Lighthouses which are designed in the Government Offices at Washington, D.C. Iron is extensively used in their construction, some of them being built wholly of this material, and of bold and original design. The drawings are very carefully elaborated, every detail being worked out, and are especially valuable as showing what is, perhaps, one of the most successful of the systems of iron construction for buildings.

I am indebted to Mr. P. J. Peltz for the fine series of lighthouse drawings, some of which were exhibited at the Institute recently. The one here given, on Sanibel Island, may be taken as a type of the class. JOHN B. GASS.

COMPETITIONS.

Congregational Church, Sidcup.—In a competition between five architects for a Congregational Church at Sidcup, Kent, the plans submitted by Mr. George Baines, of Great Winchester-street, London, have been unanimously selected by the committee. The church will ultimately seat 840 persons, and will be in the Geometric Gothic style, with a tower and spire.

Whitehaven Colliery Recreation Ground and Buildings.—The designs of Mr. George Dale Oliver, architect, of Carlisle and Workington, submitted in competition, for laying out the recreation-grounds and for the new club buildings, pavilion, &c., have been selected by the professional adjudicator, and awarded the premium. The committee has confirmed the award.

New School, Coatbridge, Scotland. — The School Board of Old Monkland have selected designs submitted by Mr. James Higgins, architect, 95, Bath-street, Glasgow, out of thirty-two sets submitted in open competition for new school, Whifflet, Coatbridge. The selected plan is designed to accommodate 1,000 children at a cost of about 8*l*. per scholar.

CLERKS OF WORKS' ASSOCIATION OF GREAT BRITAIN.

THE third annual dinner of this excellent Association was held on Monday evening last, in the Venetian Saloon of the Holborn Restaurant, Mr. T. Chatfeild Clarke, F.R.I.B.A., in the chair. About 220 members and visitors sat down to table. The usual loyal and patriotic toasts were heartily received, Mr. Aitchison replying on behalf of "The Reserve Forces."

Mr. J. Wilkinson proposed "The Architects," coupled with the name of Mr. Francis Chambers, F.R.I.B.A.

Mr. Chambers, in an able and entertaining speech, said that in his younger days those who were entitled to be ranked as architects might almost be counted on the fingers of one's hands, but owing to the extensive rebuilding operations which had been going on during the last half century in London and other large cities of the country, architects had greatly increased in numbers, although many an incompetent person had dubbed himself "architect" without any right to that honourable designation. Not only land-agents and undertakers, but even linen-drapers had been known to call themselves architects. With a view to prevent this sort of thing, and for the protection of the public, the Institute of Architects had a few years ago set on foot a system of examination in order to test the fitness of the candidates for architectural practice. Mr. Chambers went on to speak of the indebtedness of architects to clerks of works, remarking that, just as it had been said that no man was a hero to his *valet de chambre*, so might it be said that very few architects were perfect in the eyes of their clerks of works. It was the clerk of works who generally found out the weak points in specification or drawing, and who very quietly and respectfully pointed them out without making any fuss.

M. Brady proposed "The Surveyors," on whose behalf Mr. H. H. Leonard responded.

In proposing the toast of the evening, "The Clerks of Works' Association," the Chairman expressed his great gratification at the success of the Association, and said that the clerk of the works was still a very important personage, although he was no longer in holy orders, as was the fact in mediæval times. In 1365, it was recorded that the pay of the clerk of the King's works was £18. 4s. per annum—a very different sum to that which was now represented by those figures. He quite endorsed what had been said by Mr. Chambers as to the immeasurable advantage which it was to any practising architect, struggling with a number of diverse engagements, to have a responsible man upon whose perfect integrity and ability he could rely to see that the specified requirements of construction were met. The clerk of works of the present day had to supervise the details of a number of special things, such as fireproof construction, electric lighting, and heating and ventilating arrangements, all of which called for some amount of study of scientific matters. With the toast he coupled the name of Mr. F. Dashwood.

Mr. Dashwood, in reply, stated that the Association now numbered 98 members, all of whom were men of proved experience.

The other toasts were, "The Honorary Treasurer, Mr. John Oldrid Scott" (proposed by Mr. Woodley), on whose behalf Mr. Redden responded; "The President, Vice-Presidents, and Committee," proposed by Mr. Calvert, and replied to by Mr. Hocking (who stated that the President, Mr. Girling, was absent through having met with an accident, and expressed the hope that the time would come, and that before very many years, when the Association would have its own library, lecture-hall, and building museum); "The Past Officers" (proposed by Mr. King, and responded to by Mr. Moore); "The Press" (proposed by Mr. Dillon, and responded to by Mr. Brady, the editor of the *Journal* of the Association); "The Visitors" (proposed by Mr. Griffiths, and replied to by Mr. Burch); and "The Chairman," proposed by Mr. Birtchnell.

Tunbridge Wells.—Salvation Army Barracks are to be erected at Tunbridge Wells, on the site of the Old Gasworks in Varney-street. The style adopted is the Jacobean, and the front elevation is of brick, with stone dressings. The building will seat about 1,000 persons. For week-night services revolving-shutters will be so fixed as to shut off the gallery and part of the main hall. Mr. E. J. Sherwood, of Queen Victoria-street, is the architect.

SALE OF THE MATERIALS OF LORD CARRINGTON'S HOUSE.

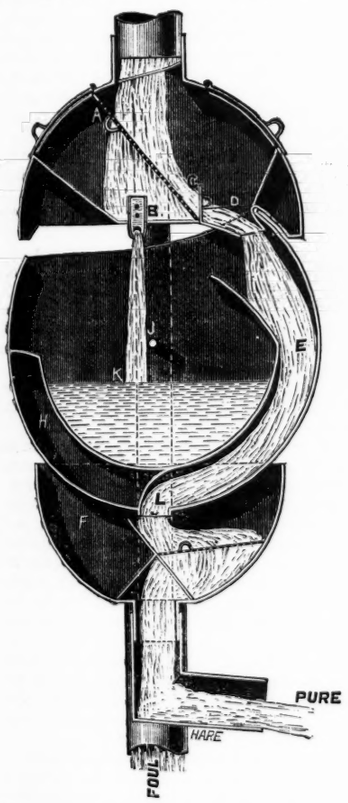
A FEW weeks will see the last of Lord Carrington's house, Whitehall, which is about to be taken down to clear the site for the Whitehall improvement and the new approach to the Thames Embankment, which is to be called Horseguards Avenue. The first portion of the materials of the mansion was sold on Tuesday last by Messrs. Horne, Son, & Eversfield, by direction of the Commissioners of Woods and Forests. They comprised the fixtures and fittings of the ball-room, the bow-room, the painted-ceiling room, the music-room, the north and south drawing-rooms, the centre-room, the dining-room, and the landing at the top of the principal staircase. The sale attracted a numerous attendance, which was not confined to the ordinary dealers in building materials, but included several gentlemen who were large purchasers of the most valuable lots. It was considered that unusually high prices were realised for the whole of the lots submitted, the competition throughout being very active. The chimney-pieces in the different apartments fetched the longest prices, 85*l*. being given for that in the dining-room, consisting of white statuary marble, inlaid with Brocatella. That in the painted-ceiling room, consisting of statuary marble, inlaid with Sienna marble, realised 75*l*.; whilst the wood chimneypiece in the steward's room, having carved caryatides, centre, mouldings and frieze, and marble jambs, was sold for 60*l*. That in the music-room, consisting of statuary marble, inlaid with Brocatella, and having carved trusses and ornaments, fetched 56*l*. Those in the north and south drawing-rooms, consisting of statuary marble, with Genoa green marble friezes and jambs, were sold for 30*l*. and 32*l*. respectively. The carved wood chimneypiece in the bow-room, with Sienna marble frieze and jambs, realised 20*l*., whilst the statuary marble chimneypiece in a bed and ante-room, inlaid with Sienna marble, was sold for 16*l*. 10s. With one or two exceptions the whole of these chimneypieces were purchased by a gentleman who was understood to be the representative of a nobleman who is erecting a new mansion, in which the chimneypieces are to be introduced. The several carved and panelled doors realised prices ranging from 5*l*. to 8*l*. each. All the floors of the various rooms are in oak, and it was notified that the flooring of the ball-room,—60 ft. in length and 30 ft. in width, was not to be sold. The stone steps of the principal staircase, 6 ft. in width, together with the balusters and hand-rail, were similarly reserved. During the sale specimens of photographic views of the different apartments in the interior of the mansion were exhibited by Messrs. Bedford Lemere & Co., architectural photographers. The remainder of the materials of the mansion will be sold on Tuesday, the 20th inst. Views of the dining-room and of the staircase appeared in the *Builder* for Aug. 9, 1884. These interiors are attributed to Sir William Chambers.

The Parliamentary Committee of the Metropolitan Board of Works have resolved to recommend that the Board's petition against the Horse Guards Avenue Bill be withdrawn upon the promoters undertaking to strike out the words providing that the Board may contribute towards the cost of the work, and to convey to the Board another piece of ground in exchange for any portion of the Embankment Gardens which may be taken for the purpose of the undertaking.

Exhibits for Edinburgh and Liverpool. Messrs. Strode & Co., the well-known gas engineers, have made a large number of articles for the forthcoming exhibitions at Liverpool and Edinburgh, including gaseliers, brackets, &c., for gas, in wrought iron and brass; a number of lamps for burning oil; some wrought-iron dog-grates and fenders; handy and elegant "five o'clock tea tables"; and a variety of miscellaneous articles, all characteristically good in workmanship and design. We had an opportunity of seeing the goods on Saturday last, at the factory in Osnaburgh-street, prior to their being sent off. While speaking of Messrs. Strode's work, we take occasion to call attention to their special pliable wrought-iron gas-pipe, which is manufactured with special regard to bending without fracture, and appears likely to come into general use wherever good work is desiderated.

ROBERTS'S RAIN-WATER SEPARATOR.

THIS useful invention, which was noticed in the *Builder* some two or three years ago, has lately been considerably improved, and the improvements form the subject of a new patent (No. 10,994 of 1885). The new separators are divided into two classes, the simple and the compound; the latter being specially contrived to remain canted for five hours after the cessation of rain, so that any subsequent rain, falling within that period, shall be at once conveyed to the storage-tank. This form is not fitted for use in towns, but is intended for country houses where it is necessary to economise rain-water to the utmost. The simple separator, illustrated in the accompanying figure, is preferable wherever the occasional loss of a few gallons in showery weather is not of importance; it is free from all complication and needs no attention under ordinary circumstances. Both the simple and the compound separators possess the following advantages over the earlier forms of apparatus:—1st, they do not require such a heavy rainfall to start them; 2nd, the time of canting varies inversely with the heaviness of the rainfall; 3rd, the exact amount of washing allowed for the roof is very easily regulated by the insertion of different time gauges at B to



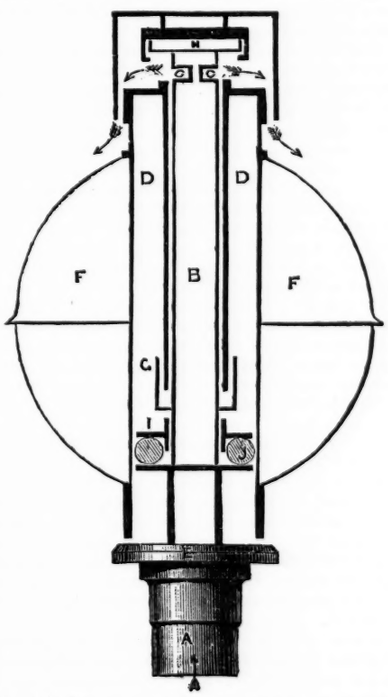
give a wash of 1, 1½, or 2 gallons to each 100 ft. of roof; 4th, leaves and other rubbish no longer need to be removed by hand, as a free passage is provided for them into the waste-pipe. In the earlier forms of separators the whole of the water passed through the strainer; now, in heavy rains, only a small portion passes through, and the surplus carries all rubbish over the surface of the strainer. The leaves are thus washed away at the commencement of the shower into F and down the foul water-pipe. This takes place while the roof is being washed clean, and before the chamber K has filled up and caused the centre part to swing round upon the pivot J and assume the position given in the illustration, where the pure water is shown passing into storage. In the earlier form of separator there was no action till the volume of water was more than could escape freely through two holes; now the filling commences as soon as there is more rain than can escape through the one small hole at L, hence it acts in a much lighter rainfall. The following is the method adopted for making the time of canting short in a heavy and long in a light rainfall. In a very light rain all the water passes through B and into K, and, if there is more than can run out at the small hole L, the chamber K fills very slowly till, the left side becoming heavier than the right, it is canted into the position shown in the section. When there is more rain than can pass through B it flows through an adjustable sluice-passage C, which can be made wider or narrower by the aid of a graduated scale marked upon it, to correspond to the area of the roof. With each increase of rainfall, the depth of the stream flowing out at the sluice C increases, causing a slight increase of pressure, and consequently a greater flow of water through B. A is the strainer, removable for washing; D is the outlet for surplus water; E the delivery-pipe.

The use of one of these rain-water separators, combined with a properly-constructed and adequately-protected tank, will, we should think, be found to solve the question of water supply in the case of many an isolated house, for by their means the water of copious rainfalls may be stored up against times of drought. In towns, the usefulness of the appliance in securing a good supply of clean soft water for domestic purposes is likely to be fully appreciated. Prior to the introduction of Mr. Roberts's separators it was not possible to obtain rain water in towns in any appreciable quantities without the sooty and other impurities from the roofs. By the use of the separator all these impurities are carried away by the first flush, and only the clean water is stored. The separator is to be seen at the Building Trades' Exhibition.

A NEW CISTERN-VALVE.

MANN'S patent high-pressure cistern-valve, of which the accompanying diagram represents a section, has been devised with a view to the utilisation of the power given by the force with which water propels itself through mains from any elevated point. The pressure, which varies according to the head of water,—say, from 20 lb. to 100 lb. to the square inch,—is, in this invention used as a means for stopping the supply the moment the cistern becomes full.

The water enters the valve at the inlet union A, passes up the stem B, and issues, at full pressure, from outlets C until the cistern is

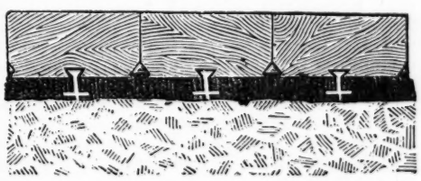


charged. As soon as the level of water in the cistern has reached and covered the lower half of the ball F, the ball and cylinder, D, commence rising from the base-plate E. Having risen ¼ in., the force of water, by the partial closing of the outlet ports C, immediately takes possession of the interior of the cylinder D, by passing down the annular tube between the cylinder and the stem B into the pressure receiver G. The force of water from this receiver, being directed upwards, strikes the upper internal portion of the cylinder D, thereby causing the ball and cylinder to leap from the level of the water in the cistern to the rubber seating, H, at the top of the valve. This at once seals the outlets C. The full pressure then acts instantaneously betwen the internal head portion of the cylinder D, and the loose flange collar, I, resting on the rubber seating, J. This seating, by the pressure of water on the flange collar, expands, and effectually closes the lower portion of the cylinder D; and thus, in conjunction with the air confined in the cylinder, the supply is immediately stopped in a silent manner. The working portion of the valve has free play, and is clear of any kind of packing. The diameter of the ball is 5½ in., and the length from base E is 9 in.

We are informed that this valve has been severely tested, and that its use has been sanctioned by several of the London water companies. It is manufactured by Mr. George Day, of 31, Liverpool-road, Islington.

WOOD-BLOCK FLOORING.

AN improved system of wood-block flooring has recently been introduced by Messrs. Geary & Walker, of London and Manchester, who are well known as specialists in this class of work. The distinguishing feature of the patent, which will be known as "Geary's improved patent 'Invincible' system of Wood Block Flooring," is that each block forming the flooring is firmly "keyed" to the substructure by means of metal "keys," which are dovetailed into the under-sides of the blocks; the other extremities of these "keys" being embedded in a specially-prepared matrix; the latter acting not only as a damp-proof course and a preservative against dry-rot, but also as a "floating" to the concrete foundation, thus rendering the usual cement-finished surface un-



necessary. Reference to the illustration here given will make this clear. By this system of flooring, each block is keyed, independently of its neighbour, to the substructure. An additional key is also formed by means of the ◁-grooves which traverse the sides of the blocks, as shown in the illustration: the mastic being forced into these grooves, thereby binding the blocks to each other and to the concrete foundation. The grooves also prevent the mastic working to the top of the blocks, and enable perfectly close joints to be obtained. As the mastic on which the blocks are bedded is strongly adhesive, a third agency thus assists in constituting what is a thoroughly solid and immovable flooring, admirable for use in warehouses, basements, railway station waiting-rooms, and offices, hospitals, churches, mansions, schools, and public buildings generally.

Messrs. Geary & Walker employ a new form of machine for preparing the blocks, ensuring mathematical accuracy in size, and consequently perfect joints when laid.

The Proposed Railway up Mount Pilatus. The project for a railway to the summit of the well-known Alpine height, Mount Pilatus, is making very satisfactory progress. A considerable portion of the 2,000,000 francs required for carrying out the undertaking has already been subscribed in Switzerland. The line will start from Alpnach, and rise gradually to a height of nearly 7,000 ft., terminating at the Hôtel Bellevue, which is situated at that altitude. The total length of the railway will be rather more than 2¾ miles, of which distance fully one half will be occupied by the necessarily circuitous curves and windings. The majority of the curves have a radius of from 200 ft. to 300 ft. The gradient varies from one in ten to one in four. Amongst the principal features of the work will be a viaduct over the Wolforbach, as well as four tunnels. When completed, the cars, which will be drawn by a rope moved by a stationary engine, will perform the ascent in about eight minutes. The Mount Pilatus railway will, in fact, be a somewhat serious competitor to the similar line already in existence up the Rigi, and the rivalry will, it appears, be still greater when the new hotels which it is designed to build upon Mount Pilatus shall have been finished.

ASSOCIATES OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

SIR,—The new Charter of the Institute was yesterday, at the close of an all-day sitting, finally passed by the Fellows without dissent. Under this Charter the right of voting on all questions, except the making of by-laws, is secured for every Associate, and nothing is enacted to prevent Associates being placed on the Council, should the by-laws so provide.

At the ordinary business meeting held on the 29th ult., another very important step, directly affecting the Associates, was taken by the Institute; and as the attendance at that meeting was not very large, I desire to draw special attention to the subject.

The scheme of "Departmental Action" originated by Professor Kerr, and brought into form by a Special Committee, of which I have the honour to be a member, was, with certain alterations, accepted by the Institute; and the members of the four standing Committees, thus created, are to be appointed at the annual meeting on the 3rd of May next.

Six seats on each of these Standing Committees are reserved for Associates, and the Council has requested Associates to volunteer to serve on them.

I wish now to impress upon my brother Associates that it is their duty to throw their energies and their enthusiasm into the work of the Institute. It will be shameful for them to complain in the future that the Institute is "sleepy" or "useless"; if such be the case it will be their own fault.

In whatever direction their particular taste and abilities lead them, there is opportunity for assisting in the work, as the four committees deal, respectively, with:—1, "Art," including Archæology; 2, "Science"; 3, "Literature"; and 4, "Practice of the Profession." These committees appoint their own chairmen, vice-chairmen, and hon. secretaries, and have the power of initiating their work; it will be their duty to carefully watch and consider everything of interest to architects, each in its special department, leaving the council free to exercise all the functions properly appertaining to the supreme executive authority.

I therefore hope that Associates will now come forward, and be prepared to exercise some self-denial, for the sake of our noble art, of the honourable profession to which we belong, and, may I add, of our representative Institute, which, having successfully struggled with those ills which are incidental to childhood and to youth, has now passed into the period of manhood. May it be a vigorous and a useful one!

April 7. G. RICHARDS JULIAN.

SUNDERLAND MUNICIPAL BUILDINGS COMPETITION.

SIR,—I understand it is freely rumoured in Sunderland and the district that a Sunderland architect, with friends among the authorities, had his sketch-design prepared before the advertisements were issued, and is more than likely to be the successful competitor in the Sunderland Municipal Buildings Competition. Time will show what truth there is in such rumours. But, as a competitor, I for one intend to address a letter to the Council, urging them to give a guarantee of fair play, by appointing Mr. Waterhouse or some equally eminent architect, to adjudicate on the plans, in which case the local architects will stand as good a chance as others. A COMPETITOR.

STONE-SAWING AND MOSAIC MANUFACTURE.

SIR,—As some of the readers of the report of the stone-working machinery case (Hall & Co. *v.* Burke & Co.), in your issue of March 27th [p. 489], may be interested in the conversion of marble, granite, and other hard stones, I send you a short description of the Belgian machines purchased by the defendant, and referred to in the trial, as they are without doubt considerably in advance of any machines for the like purpose yet made in this country.

The swing or saw-frame carrying the blades is driven by a crank attached to a countershaft in the usual manner, but in place of the connecting-rod being attached to the end of the saw-frame, a pair of side levers are arranged to take hold of the frame at about the centre on either side, thus giving a longer connecting-rod and increased steadiness in working. The blades are lowered into the stone by an improved form of downward screw-feed, which can be regulated in speed in proportion to the hardness of the stone being cut; at the same time, the blades are kept steadily to their work at an even pressure. One of the chief difficulties in converting hard stones is in securing a regular and uniform supply of sand and water over the whole surface of the block, but this has been well overcome in the machines under notice. In the place of the ordinary contrivances a wooden sand-box extending the whole length of the stone is employed; this is perforated, and jets of water from a flexible pipe are allowed to fall in it in the usual way, but by an ingenious automatic cam-motion the sand-box is arranged to traverse slowly in a transverse direction across the face of the stone, thus all the blades are equally supplied with abraiding particles, and their cutting is uniform. By simply pulling a lever the saw-frame containing the blades is automatically raised or lowered as may be required. There are other good points in these frames, but the above are the most important. The downward cutting speed in tolerably hard marbles is about ¾ in. per hour.

M. POWIS BALE,
Author of "Stoneworking Machinery," &c.

THE MARNEY MONUMENT.

SIR,—There is a passage in the inscription quoted from the Marney monument at Little Horkesley, Essex, which preserves a mode of address or designation now repudiated as "bad form." Your engraving reads thus:—"Wife to Mr. Thomas Fyndorne, Esquire." We do not now admit the conjunction of magister and squire, and it is of interest to know if the inscription is correctly so read.

The prefix "layer" is not topographical, but, like the affix in Layer Marney, both words are patronymics. Sir Robert de Marney, Kt., *temp.* Ed. III., married Alice, daughter and heir of Richard Layer, and their joint names are thus preserved to this day. Layer is a common name in the Eastern Counties, where it is possibly connected with oyster culture (?). A. H.

April 3rd, 1886.

The Student's Column.

OUR BUILDING STONES.—V.

RESISTANCE TO THRUSTING STRESS.

STONES having a somewhat similar appearance to each other are often found on examination to be of different strength, so that considerable attention has been paid to the results of experiments dealing with this part of the subject.

The weight necessary to crush a stone varies with the state of cohesion and hardness of the particles composing it. It follows, therefore, as the amount of water a stone absorbs is proportionate to the state of aggregation of the particles composing it, that the crushing weight will be proportionate to the amount of absorbed water. Or, to put it in another way, suppose we know the average amount of water absorbed by certain stones, we can get an idea of their relative strength. A careful comparison of several published accounts of crushing weight and absorption of water by stone, would show that this rule is almost invariably borne out. The few exceptions that exist are due in a great measure to the insufficient manner in which the stones have been described, causing the comparison to be made between stones widely different from each other, but which, unfortunately, bear the same name.

In comparing published results of experiments with each other, care should always be taken to see whether the exact stratigraphical horizon of the stone in each quarry is stated. Many recorded "crushing weights" do not show this, and it is quite evident, therefore, that mistakes are sure to happen, unless there is only one bed worked for building purposes in each of the quarries whence the stones were respectively obtained.

Again, where stones found in quarries adjacent to each other are known collectively under one term, it is very necessary to be certain not only of the exact horizon, but of the name of the quarry of each of the specimens examined. The terms Portland stone, Corsham stone, Bath stone, for example, require something further to qualify them, for there are several kinds of stone included under each of these headings, varying greatly in structure, texture, and durability. Unless these terms are qualified, all records of their chemical or physical characters are of little or no use.

Occasionally, after going carefully into the matter, we may find that the beds from which certain kinds of stone, having good repute a few years ago, were obtained, have been worked out or abandoned, as becoming too expensive to work. In spite of this, however, to keep up the rate of sale the same names are retained to the present day, and designate stones which may come from the same localities, but are quite different in many particulars from those to which the names originally referred. (We shall point them out as these articles progress.) The discrepant results, on comparison, which may arise from this cause are at once manifest. Sometimes no appreciable difference in quality or durability exists between the original stones and those bearing the original names, but the latter are quite as often stones of inferior quality. In all cases the crushing weight, amount of absorption of water, &c., must vary, and it is for these reasons that all recent results should be the most trustworthy. Unfortunately, however, in the absence of recent experiments, the old ones are still adhered to: hence many serious errors arise.

Stones made up of large shells are difficult to deal with in selecting pieces for crushing; it is not easy to obtain average pieces. It is simply ridiculous to find the strength of 1 in. cubes of such stones (as has often been done): *large* pieces should always be experimented upon, certainly not smaller than 6 in. cubes. It can be shown that in many cases no very great difference exists between the relative crushing weights of 1 in. and 6 in. cubes of stones of a homogeneous character; but when rocks contain large crystals, such as the porphyries, or large shells, such as are found in many limestones, the crushing weight must vary considerably according to the general position of the cleavage planes of the crystals, or the predominant direction of the exterior faces of the shells.

A small cube might fail to prove the existence of cracks and flaws invisible to the naked eye, in large blocks of the same stone. The comparative strength of the large blocks would thus be lower than the examination of the small cube would seem to warrant, for it must be remembered that the strength of a stone is only the strength of its weakest part.

Experiments as to the strength of stone also vary according to the machinery used, as well as the skill and care with which the experiments are made and recorded.

In a paper read at the Royal Institute of British Architects,* Captain Seddon, R.E., says:—

"If we take a stone which has been more largely used, perhaps, than any other, namely, Portland, we learn from Barlow that its crushing strength ranges from about 1,384 lb. to 4,000 lb. per square inch, whilst, in the experiments made by this Institute and recorded in your sessional papers for 1864, the mean resistance to crushing per square inch arrived at was, for 2-inch cubes, 2,576 lb.; for 4-inch cubes, 4,099 lb.; and, for 6-inch cubes, 4,300 lb.

"According to Rennie its crushing strength may be taken as 3,729 lb. per square inch, which has been followed by Molesworth in his 'Handbook,' whilst in Hurst's 'Handbook' it is given as 2,022 lb. per square inch."

The many kinds of Portland stone, the different methods pursued in making the experiments, amount of seasoning and direction of the natural bed of the stone when crushed, no doubt cause the discrepancies between these results.

In testing the crushing weight of stones it is desirable, for comparison's sake, that they should be of the same size and shape. Cubes are generally used, but occasionally quadrants and octants of columns of different diameters and heights are tested for special purposes. The results obtained from the latter should be kept by themselves as much as possible.

When cubes are used they should all be carefully dressed by rubbing down in the ordinary manner, and the faces which have to receive the compressing force should be made parallel. Some experimentalists, knowing how important it is to have these faces exactly parallel with each other, and to have all the specimens of the same height, as nearly as possible, finish them within a steel frame, which encloses and holds all the stones at the same time. After dressing one set of faces in this manner they are all turned over, and the opposite set is similarly treated. Before being crushed, some stones have been gauged to the thousandth part of an inch.

It is particularly necessary to notice whether the stones to be crushed are placed on or against their natural bed.

* See the *Builder*, vol. xxx. (1872), p. 418.

The machine used to ascertain the amount of resistance to thrusting stress is generally the hydraulic press. The principle of the press is obvious to any one who understands the equal transmission of fluid pressure. Conceive that a closed vessel with its upper surface level is completely filled with water, and that two openings are made in it, which are replaced by pistons of areas 1 and 10 square inches. If a weight of 1 lb. be placed on the smaller piston, a pressure of 1 lb. will be felt everywhere in the interior of the fluid, and the pressure on the larger piston will be 10 lb. Thus a force of 1 lb., acting on the area 1 square inch, produces a pressure of 10 lb. on the area 10 square inches.*

The principle of the press admits of extension as far as the strength of the containing sides of the pressing-chamber will permit. Very large presses have a hemispherical base.

The circular of Messrs. Poole & Son relating to Bath stone states that the specimens are placed in the press between parallel iron plates, and the pressure is communicated to the cubes by interposing above and below each cube, two parallel plates of sheet lead, and the upper or movable plate communicates its force upon the upper plates of lead by a conical heap of founders' sand carefully pressed by the upper plate into a parallel mass, so as to press equally all over the upper bed of the cube. It is stated that this method was adopted to insure an equal pressure on every particle of the upper and lower beds of the stone.

The pieces of stone are also frequently bedded with pieces of pine varying from ¼ in. to ½ in. in thickness; and leather has likewise been used.

Mr. David Kirkaldy, who has had great experience in testing the crushing weight of rocks, if we may judge from the number of results before us, appears to prefer to experiment on three 6-in. cubes. It is not an easy matter, however, to get all the cubes exactly 6 in.: so, to be precise, he shows the dimensions of the stones to two places of decimals. He works out the base area of each sample, shows the stress, pounds per square inch, and tons per square foot when the stones cracked slightly; and similarly when they were crushed and the steelyard dropped. The mean strength of the three pieces is then struck.

Some authorities seem to think that experiments should be made on prisms, whose heights are about one and a half times their diameters.

Results show that the weight necessary to crush a stone varies considerably in different samples, and even in different cubes from the same sample. Although it is usual to strike the average in all cases, in practice it will never be possible to get all the stones equal to the average, and therefore very great allowance must be made for weak, bad, and cracked blocks. Thus, we see that experiments indicate more than the real strength of the material. Professor Rankine shows that this remark applies for another reason, for the fracture of stones under compression generally takes place by their shearing on a plane inclined at a slope having 1½ rise to 1 of base.

There is practically no cause of danger in ordinary buildings by the crushing of the stone, of which they are built.

Thus,—"The greatest stress that comes upon any part of the masonry of St. Paul's Cathedral is hardly 14 tons per square foot. In St. Peter's, at Rome, it is about 15½ tons per square foot. The weakest sandstones (used in building) that exist will bear a compression of 120 tons per foot, while the resistance of ordinary building stones ranges from 140 to 500 tons per square foot, and in the case of granites and traps 700 or 800 tons per square foot."†

The stones in some forms of arches, retaining walls, &c., are liable to be crushed by reason of the pressure being concentrated upon certain points. The walls of buildings made of stone of different qualities are sometimes subjected to very severe strains by reason of the inferior stones decaying, leaving the pressure which was exerted on them to be distributed on the others of better quality surrounding.

Very few experiments testing the transverse strength of stone have been carried out. We know that some stones are more capable of taking a bending stress than others, and seeing that so many stones in practice are subjected to a bending stress it is remarkable that so little attention has been paid to it. Most of the samples which have been tested are used for paving, but we want to know more about the transverse strength of stones used for stairs, &c.

* Prof. Goodeve, "Princ. of Mechanics," 1883, p. 252.
† "Notes on Building Construction." Rivingtons, 1879. Part III., "Materials," p. 6.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

16,485, Quays, &c., Retaining Walls, and Similar Structures. H. J. Fourmond (Rouen).

The walls are of plated ironwork in place of the ordinary stone or concrete now in use. Beams and uprights are so placed that earthwork may be thrown up behind and around them, the front of the uprights being plated with iron, mud or earth in a liquid or plastic state is poured in so as to fill all the interstices, and, if desired, may be built on shore and sunk into place by means of air-tight caissons, which are then removed. Piers are constructed in a similar manner, two walls tied together being employed and sunk into position, and then filled in the same way as described. Docks, locks, &c., are built on slipways, launched, floated, and then sunk into place by being filled with water. Retaining walls can be founded on concrete or masonry in place of tiles, as their foundations are not commonly under water, and are anchored to piles or masonry in a precisely similar manner to that described above.

17,039, Core Stoves. R. Buchanan.

Stoves for drying moulds and cores are heated by gas from a gas producer in connexion with the stoves. The gas is admitted to the stove with air, and burns near the roof the products passing away through holes in the floor.

17,076, Chimney Top. E. and J. M. Verity.

A cylindrical shaft which may have a conical top is constructed externally with a number of spiral, trough-like flutes, or hollow grooves having open spaces or slots between them. The whole is made in sections which can be easily fitted together.

17,070, Fixing Rounds of Ladders. T. Ray.

The hollow metal bar or tube which forms the round of the ladder has taper ends, and when inserted in a countersunk hole in the side-piece to which it is attached, this taper portion is pressed outwards by pincers to fill the hole and fix the tube in position.

NEW APPLICATIONS FOR PATENTS.

March 26.—4,235, R. Stoffert and T. Dykes, Construction of Girders.—4,239, A. Wood, Ladders, &c.—4,243, J. Brierley, Ornamenting Wooden Floors, &c.—4,255, R. Little and T. Duncan, Water-waste Preventer.—4,271, A. Tipper, Screwdrivers, &c.—4,281, W. Hellier, Brick Moulding Machines.—4,288, J. Walker and H. Worsey, Sash, Casement and Door Fasteners.

March 27.—4,330, G. Couch, Brick, Stone, Terra-Cotta, Concrete, or other Walls.—4,332, G. Couch, Ridge, Hip, and Wall Tiles.—4,331, G. Couch, Roofing and Flushing Tiles.—4,356, J. Tonks, Screw-driver.

March 29.—4,361, J. Walker, Door Knobs, &c.—4,378, J. Barnes, Syphon Cistern.

March 30.—4,435, W. Rowe, Plough and Sash Fillester Plane.—4,439, J. Sharp, Chimney Cowl and Ventilator.

March 31.—4,479, G. Inglis, Window Guard.—4,482, C. Wharton, Automatic Window-sash Fastener.—4,496, T. and J. Holt, Flushing Cisterns.—4,507, N. Thompson, Connecting Lead Pipes, &c.—4,521, A. Boult, Earth Closets.

April 1.—4,547, W. Johnson, Brick-making Machinery.—4 551, A. Nichols, Springless Sash Fastener.—4,567, G. Rayner and H. Hughes, Retaining Doors or Shutters in Open or Closed Positions.—4,577, A. Harding, Air Extractors.—4,580, J. Parker, Dry Earth and Ash Closets.—4,588, W. Lennon, Counterbalances for Window-sashes, &c.—4,596, C. Abel, Preventing Fungus in Flooring.

PROVISIONAL SPECIFICATIONS ACCEPTED.

447, H. Peters, Portland Cement.—2,199, W. Tylor and Others, Closet-basin Joints, &c.—2,310, D. Swan, Pigments.—2,482, W. Crow and W. Coley, Compound for Coating Wood, Stone, &c.—2,553, B. Hawerkamp, Sawing Machines.—2,671, C. Swindell and W. Clifford, Chimney or Ventilating Caps.—3,037, J. Halley, Artistic Exposing and Erecting of Gas-pipes throughout Buildings to form Picture Rods.—3,073, E. Chatham, Connecting Pipes.—3,909, H. Peters, Portland Cement.—2,789, D. Swan, Pigments.—3,019, G. Buffham, Ventilators.—3,040, J. Hampton, Cramps or Clamps.—3,106, H. Jensen and Others, Electric and Magneto Bells.—3,123, H. Rothery, Locks and Latches.—3,290, B. Webber, Drawing Boards and T-squares.—3,570, J. Clayton, Mouthpieces for Speaking Tubes.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

2,718, R. Adams, Self-closing Appliances and Checks for Doors.—6,465, G. Haywood and G. Williams, Ventilating Apparatus.—7,082, J. Ebner, Composition for Securing Parquet Flooring to Stone, Concrete, Wood, &c.—7,204, J. Kinnaird and Others, Cooking Ranges.—7,410, J. Morley, Waste-preventing Ball Valve and Lever.—2,801, S. Wright and R. Bate, Flushing Cisterns for Water-closets, &c.—6,837, J. Corbett, Connecting Lead Pipes, &c.—6,889, W. Paul, Window Ventilator.—7,189, W. Joy, Manufacture of Cement.—2,961, J. Davis, Fanlight Fasteners.—2,983, A. Boult, Ventilators.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

March 29.

By G. A. Wilkinson.

City—2, Laurence Pountney Hill, 28 years, ground-rent 120*l.* £4,960
Marylebone—25, Montagu-square, and stabling, 16 years, no ground-rent 1,690

By Ventom, Bull, & Cooper.

Dulwich, Friern-road—The residences, Fairholm and Hillcrest, freehold 1,240

March 30.

By W. R. Norris.

Waterloo-road—24, Oakley-street, 25 years, ground-rent 10*l.* 310

By E. E. Croucher & Co.

Stoke Newington—5, Gordon-road, 73 years, ground-rent 4*l.* 6s. 305

By A. Richards.

West India Dock-road—Nos. 68 and 70, copyhold ... 900
Teddington—Ground-rent of 8*l.* a year, reversion in 80 years 155
Stratford, Carnarvon-road—Two plots of freehold land 240

By A. Walton.

Greenwich, 64, Ashburnham-grove, 60 years, ground-rent 4*l.* 4s. 290

By Bradshaw Brown.

Bow-road—16, Addington-road, 61 years, ground-rent 5*l.* 465
Wanstead—1 to 4, Sultan-road, 80 years, ground-rent 10*l.* 275

March 31.

By Rushworth & Stevens.

Pentonville—21, Lloyd-square, 36 years, ground-rent 12*l.* 10s. 650
Grosvenor-square—95, Park-street, 14 years, rent 130*l.* 450

By Blake & Dannat.

East Dulwich—88 and 90, Henslowe-road, freehold 610
Greenwich—17 and 18, The Circus, freehold 1,580
32, Lorne-terrace, 78 years, ground-rent 5*l.* 0s. 6d. 270

By Worsfold & Hayward.

Eastry, near Dover—The freehold residence, Lauriston House, and 5¼ acres 1,125
The Wheelwright's Yard and Workshop 250
Walton Cottage, and four other cottages, freehold 710
Freehold Orchard, 0a. 3r. 24p. 140
St. Margaret's—The Hope Inn, freehold 800
St. Margaret's Villa, and two Cottages, freehold 765

MEETINGS.

Saturday, April 10.

Architectural Association.—Visit to the Constitutional Club, Northumberland-avenue. Members to assemble at 3 p.m.

St. Paul's Ecclesiological Society.—Visit to the Church of St. Bartholomew the Great, Smithfield. 3·15 p.m.

Royal Institution.—Professor Oliver Lodge on "Fuel and Smoke." I. 3 p.m.

Edinburgh Architectural Association.—Visit to Hatton House.

Monday, April 12.

Surveyors' Institution.—Adjourned discussion on Mr Wm. Mathew's paper on "The Taxation of Real Property." 8 p.m.

Society of Arts (Cantor Lectures).—Mr. Alan S. Cole on "The Arts of Tapestry-making and Embroidery." II. 8 p.m.

Society of Antiquaries of Scotland (Edinburgh).—8 p.m.

Tuesday, April 13.

Institution of Civil Engineers.—(1) Discussion on Dr. Percy Frankland's paper, "Water Purification." (2, time permitting) Paper by Mr. Henry Ward on "Brick-making." 8 p.m.

Wednesday, April 14.

Society of Arts.—Dr. C. Meymott Tidy on "The Treatment of Sewage." 8 p.m.

Thursday, April 15.

Society for the Encouragement of the Fine Arts.—Mr. E. P. Loftus Brock on "Old Engravings of the Italian Schools." 8 p.m.

Parkes Museum of Hygiene.—The Rev. F. Lawrence on "Eremacausis: Sanitary Burials." 8 p.m.

Edinburgh Architectural Association.—Address by Mr. James Sellars, of Glasgow. 8·3 p.m.

York Architectural Association.—Mr. William Hepper on "The Development of Window Tracery in England." 7·30 p.m.

Dundee Institute of Architecture.—Social Meeting. 7 p.m.

Friday, April 16.

Parkes Museum of Hygiene.—Extraordinary General Meeting for the purpose of considering the desirability of amalgamating with the Sanitary Institute, and applying for a Royal Charter. 5 p.m.

Saturday, April 17.

Royal Institution.—Professor Oliver Lodge on "Fuel and Smoke." II. 3 p.m.

The Working Lads' Institute.—The Committee of the new Working Lads' Institute, Whitechapel, have instructed their architect, Mr. George Baines, to prepare plans for the second section, consisting of a large swimming-bath and gymnasium and lecture-hall for 550 persons. About fifty unemployed workmen have recently been engaged in the excavations for the swimming-bath, 400*l.* having been voted from the Mansion House Relief Fund for this purpose.

Miscellanea.

Brickmaking in New York.—The largest brickmaking district of the United States is that of Haverstraw, New York State, on the Hudson River, thirty-two miles above New York. The forty-five brickyards of the district, with a capacity for making 340,000,000 bricks annually, turned out 300,000,000 in 1885, and a similar number in 1884. Employment is found for about 2,000 men, besides 300 in the river carrying trade, which keeps forty-four barges and fifty small vessels going. Haverstraw bricks are preferred on account of the excellent sand and clay used, and fetch between 25 and 50 cents. more per 1,000. Their average price last season was 6 dols. per 1,000 in New York, after paying 1 dol. river freight and 1 dol. to 1·25 dol. per 1,000 royalty to the owners of the land where the yards are situate. The works use during a season 42,000 cords of wood for heating the kilns, at 5 dols. per cord; 12,000 tons of coal dust, at 2 dols. a ton; and 4,000 tons of coal, at 4·25 dols. a ton; total cost for fuel, 251,000 dols. The total amount of royalties paid was about 337,000 dols.; and wages (averaging 2·25 dols. a day), 776,000 dols., during a season lasting about six months. Two hundred patent brick presses are employed in the manufacture. The total gross receipts last year are given at 1,800,000 dols. The industry was established at Haverstraw about fifty years ago. At that time 3 dols. per 1,000 was a fair price. Quotations have been as high as 9 dols.

New York Underground Electric Railway.—The New York District Railway Company recently published an illustrated circular descriptive of its projected system of underground railways for the great American port. In addition to the routes extending from the Battery to Harlem, there are several others running to the Second and Ninth Avenues at Union-square, as well as a western division along the Upper Broadway. The Broadway is, according to the plans, excavated from curb to curb, to a depth of not less than 16 ft., and occupied by four railroad tunnels. There are likewise a series of smaller tunnels for the purpose of conveying water, steam, gas, &c., besides other electrical conductors of various descriptions. The roof structure is supported by iron columns, which separate the tunnels, whilst the panels in between consist of a new non-resonant material, called ferflax. It is proposed to construct the roof of iron beams and steel plates, upon which there will be laid a concrete foundation for the pavement surface. The cars will, when completed, be run by electricity, thus entirely preventing the smoke nuisance, and, moreover, rendering travelling far more healthy. The cars and stations will also be lighted up with the electric light. The Company omits to state the estimated cost of the enterprise.

A New Sewage Process.—In the *Chemical News* of the 3rd of April we have an account of a new sewage process, the invention of Mr. A. McDonald Graham. It is well known that the sewage of many manufacturing towns in the North of England consists for the most part of surface-water and refuse from mills and factories, and contains but little plant food. It would be a very costly operation to irrigate land with such a large volume of water, and when treated by precipitation, the sewage of these towns deposits mud which the farmers cannot be induced to cart away. Mr. Graham proposes to regenerate this mud at a comparatively small cost, and make it again available as a precipitating agent; and by the same process of slow oxidation, to burn off the organic matter without the escape of any noxious or unpleasant odours. The first crude conception of the process appears to be due to a Japanese gentleman who was a student at the Imperial College of Engineering, Tôkiô, Japan, in 1879, and being Asiatic in its origin, it differs somewhat from our preconceived European ideas. One thing worthy of notice is the fact that the burning or oxidation process commences at a point furthest from the source of heat, travelling from the top of the mixture to the bottom.

St. Thomas Charterhouse School of Art.—The Lord Mayor will, on Saturday afternoon at 3 o'clock, distribute the prizes awarded to students of this school. The chair will be taken by the Rev. J. R. Diggle, M.A., chairman of the London School Board. On Friday evening there will be a free exhibition of students' works.

Birmingham Architectural Association. The eighth ordinary meeting of the current session was held in the library at Queen's College on Tuesday evening last. The President, Mr. F. B. Osborn, was in the chair, and there was a good attendance. The Vice-President, Mr. John Cotton, gave his annual address, in the course of which a contrast was drawn between the ancient guilds of masons, wrights, &c., and the modern system of professional practice. Mr. Cotton very ably pointed out the immense advantages to be gained by architects associating together for purposes of study, and for the advancement of their art; and in referring to the junior members of the Association, showed very clearly the great profit which might be derived if the attendance at the various classes held during the session was regular and enthusiastic. A vote of thanks, proposed by Mr. W. Doubleday, and seconded by Mr. V. Scrutor (hon. sec.), was unanimously accorded to the Vice-President for his very instructive address. After a response from Mr. Cotton, the meeting terminated.

The Relation of Geology to Engineering.—On the 2nd inst. Mr. George F. Harris, F.G.S., lectured before the Junior Engineering and Scientific Society on "The Relation of Geology to Engineering" at the Hawkstone Lower Hall, Westminster-road, S.E. The lecturer prefaced his remarks by explaining the mode of formation of sandstone, limestone, granite, and slate, and showed by the variations in thickness of strata, together with their natural sequence, that the civil engineer should lay the foundation of his profession by acquiring a knowledge of geology. Reference was made to the great value of stratigraphy in estimating contracts for the construction of tunnels and railway-cuttings, and the conditions necessary to ensure the success of artesian wells and well-boring generally. Subsequently attention was directed to some of the principal difficulties met with in coal-mining, and the scientific methods of laying foundations of large structures, such as embankments, piers, and breakwaters, were explained. A brief account of road-metal and the kind of stones necessary to bear heavy traffic brought an interesting lecture to a close.

Crystal Palace Company's School of Art.—A division of this School for promoting the study of the artistic and economic improvement of estates and landscape gardening, has just been made. The principal is Mr. H. E. Milner, A.-M. Inst. C.E. We learn from the prospectus that the student is under articles which secure both theoretical instruction and the advantage of practical outdoor work. During the employment of the student in practical work, a certain salary may be allowed. The term of studentship is three years, one year at least of which is devoted to outdoor work. A premium is payable to the Company. The lecturers in connexion with the classes are:—For Architecture, Mr. G. Richards Julian, A.R.I.B.A.; for Physiological Botany, Soils, &c., Mr. R. Houston, F.L.S.

Turpin's Parquet Floor, Joinery, and Wood Carving Company, Limited.—This Company, of which the prospectus is printed in our advertisement columns, has been formed for the purpose of taking over as a going concern, and further developing, the well-known business of parquet flooring, joinery, wood carving, and modelling, which has been carried on in London by Mr. M. F. C. Turpin for the past thirteen years and upwards. It is stated that the accounts of the business during the four years ending the 31st of January last show the profits to exceed 25 per cent. upon the capital employed. The services of Mr. Turpin will be retained by the Company as Managing Director. We may mention that some of Mr. Turpin's productions are on exhibition in the Building Trades' Exhibition at Islington.

Royal Academy.—The Class for Modelling in the Architectural School has terminated for the session; and a series of demonstrations will be given by Mr. Stannus, on Monday evenings from six to eight p.m., on "Accessory Features in Architectural Ornament," as follows:—April 12 and 19, "Tablets and Shields"; May 3 and 10, "Festoons," &c.; May 17 and 24, "Masks," &c.; June 1 and 8, Miscellaneous.

Faversham.—Mr. William Eve, Union-court, Old Broad-street, has been selected by the Guardians of Faversham to re-value, for rating purposes, the whole of the rateable hereditaments in their Union, extending over an area of 44,000 acres.

Monument to Liebig.—For some time past subscriptions have been collected for the purpose of erecting a monument to the late Baron von Liebig, whose fame as a chemist was as great in England as in his native country, Germany. Up to the present the sum of 5,000*l.* has been subscribed, and the committee, one of whom is Liebig's celebrated pupil, Professor Hermann, formerly of the London Royal College of Chemistry, have unanimously decided that the monument shall be erected at Giessen, at whose University the deceased chemist first attained distinction. It is intended that the monument shall consist of a statue of Liebig, surrounded by several figures, symbolical of the sciences and agriculture, all cast in bronze. The pedestal is to be of polished red granite, placed upon a foundation, bordered by a series of steps in black granite. The committee have not yet arrived at a final decision as to the precise spot where the statue shall be erected, but it will, in any case, be placed in a commanding position facing the University, and, in all probability, close to the new chemical laboratory.

Luton.—New "Salvation Army Barracks" are about to be erected in Lea-road and Vicarage-road, Luton, Bedfordshire. The lowest estimate received for the work is 2,190*l.*, and the hall will accommodate 2,000 persons. The plans and quantities have been prepared by Mr. E. J. Sherwood, Queen Victoria-street, London, and the work will be carried out under his superintendence.

Lifts.—Messrs. A. Smith & Stevens have received an order for a large 1-ton lift, travelling 70 ft., for Messrs. W. Briscoe & Son's new warehouse at Sydney. This will be driven by a gas-engine, and is to be a duplicate of lifts supplied last year for the Hon. B. Rundle's new building in the same town.

Leyton.—Mr. George Baines, architect, Great Winchester-street, London, has been instructed to prepare plans for a Baptist church at Cann Hall-road, Leyton. The designs provide accommodation for 660 persons, and are in the Romanesque style.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 0 0	7 0 0
Teak, E.I. ....load	12 10 0	15 0 0
Sequoia, U.S.....foot cube	0 2 4	0 3 0
Ash, Canada ....load	3 0 0	4 10 0
Birch ,, ...	3 0 0	4 10 0
Elm ,, ...	3 10 0	4 15 0
Fir, Dantsic, &c.	1 10 0	4 10 0
Oak ,, ...	3 0 0	5 0 0
Canada	5 10 0	6 10 0
Pine, Canada red	3 0 0	4 0 0
,, yellow	3 0 0	5 0 0
Lath, Dantsic ....fathom	3 10 0	5 0 0
St. Petersburg	4 0 0	6 0 0
Wainscot, Riga.....log	2 15 0	4 10 0
,, Odessa, crown	3 12 6	3 15 0
Deals, Finland, 2nd and 1st...std. 100	7 10 0	8 10 0
,, 4th and 3rd	6 0 0	7 10 0
Riga	6 0 0	8 0 0
St. Petersburg, 1st yellow	9 0 0	14 0 0
,, 2nd ,, ...	7 8 0	8 15 0
,, white	7 0 0	10 0 0
Swedish....	6 0 0	15 0 0
White Sea	7 0 0	17 10 0
Canada, Pine 1st	17 0 0	30 0 0
,, 2nd	12 0 0	17 0 0
,, 3rd, &c.	6 0 0	10 0 0
,, Spruce 1st	8 0 0	11 0 0
,, 3rd and 2nd	5 0 0	7 10 0
New Brunswick, &c....	5 0 0	7 0 0
Battens, all kinds	4 0 0	13 0 0
Flooring Boards, sq. 1 in.—Prepared, first	0 9 0	0 13 0
Second	0 7 6	0 8 6
Other qualities	0 5 0	0 7 0
Cedar, Cuba.....foot	0 0 3½	0 0 4
Honduras, &c.	0 0 3	0 0 4
Australian	0 0 2½	0 0 3
Mahogany, Cuba	0 0 5	0 0 7½
St. Domingo, cargo average	0 0 5	0 0 7½
Mexican ,, ...	0 0 3½	0 0 4½
Tobasco ,, ...	0 0 4	0 0 6½
Honduras ,, ...	0 0 4½	0 0 6
Maple, Bird's-eye....	0 0 6	0 0 8
Rose, Rio .....ton	7 0 0	10 0 0
Bahia....	8 0 0	13 0 0
Box, Turkey .....foot	5 0 0	18 0 0
Satin, St. Domingo	0 0 7	0 1 0
Porto Rico	0 0 8	0 1 3
Walnut, Italian	0 0 4	0 0 5

METALS.		
IRON—Pig in Scotland .....ton	0 0 0	0 0 0
Bar, Welsh, in London....	4 10 0	4 17 6
,, ,, in Wales	4 5 0	4 10 0
,, Staffordshire, London	5 15 0	6 10 0
Sheets, single, in London....	6 10 0	8 10 0
Hoops ,, ...	6 0 0	7 0 0
Nail-rods ,, ...	5 15 0	6 10 0
COPPER—		
British, cake and ingot .....ton	44 10 0	45 10 0
Best selected	46 0 0	47 0 0
Sheets, strong....	53 0 0	0 0 0
,, India	48 0 0	50 0 0
Australian	47 9 0	47 10 0
Chili, bars	41 7 6	42 0 0

METALS (*continued*).	£.	s.	d.	£.	s.	d.
YELLOW METAL.....lb.	0	0	4½	0	0	4½
LEAD—Pig, Spanish	0	0	0	0	0	0
English, common brands.....	0	0	0	0	0	0
Sheet, English	14	10	0	14	12	6
SPELTER—						
Silesian, special .....ton	0	0	0	0	0	0
Ordinary brands	0	0	0	0	0	0
TIN—						
.....ton	0	0	0	0	0	0
Banca	0	0	0	0	0	0
Billiton	93	0	0	93	10	0
Straits	93	10	0	94	0	0
Australian	97	0	0	0	0	0
English ingots.....						
ZINC—						
English sheet .....ton	0	0	0	0	0	0

OILS.	£.	s.	d.	£.	s.	d.
Linseed .....ton	20	5	0	20	12	6
Cocoanut, Cochin	29	0	0	29	5	0
Ceylon	25	10	0	25	15	0
Copra.....	0	0	0	0	0	0
Palm, Lagos	33	0	0	0	0	0
Palm-nut Kernel	0	0	0	0	0	0
Rapeseed, English pale.....	22	10	0	0	0	0
,, brown	21	0	0	21	5	0
Cottonseed, refined	16	15	0	17	15	0
Tallow and Oleine	25	0	0	45	0	0
Lubricating, U.S.	6	0	0	10	0	0
,, Refined	8	0	0	13	0	0
TURPENTINE—						
American, in casks.....cwt.	1	9	6	1	10	3
TAR—Stockholm .....barrel	0	18	0	0	19	0
Archangel.....	0	10	0	0	11	6

COMPETITIONS AND CONTRACTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
New Infirmary Hospital	Belper Union.....	Not stated	Not stated	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Cemetery, Chapels, &c.	Edmonton Local Board	*Official*	April 12th	ii.
Mortuary Buildings	St. Luke's Vestry	do.	April 13th	ii.
Iron and Stoneware Pipes	Edmonton Local Board	G. E. Eachus	do.	ii.
Railway Stores	L. B. and S. C. Ry. Co.	*Official*	April 15th	ii.
Laying on Gas and Supply of Fittings	St. Saviour's Union.....	Jarvis & Son	do.	xv.
Steam Boilers, Engines, Machinery, &c.	do.	do.	do.	xv.
Street Cleaning and Dust Collecting	Vestry of St. Martin-in-the-fields.....	H. Jacques.....	do.	xv.
Engine Shed and Cleaning and Painting.....	Midland Railway Co....	A. A. Langley	do.	ii.
Paving, Kerbing, Channelling, &c.	Dartford Local Board	*Official*	April 16th	xv.
Painting Grand Stand, &c., Kempton.....	The Proprietors	.....	April 17th	xv.
Sewage Treatment	Hendon Local Board ...	E. Cousins	do.	ii.
Sewering, Paving, Kerbing, &c., of Street	do.	*Official*	do.	ii.
Stoneware Pipe Sewers	Hornsey Local Board...	T. De Courcy Meade ...	April 19th	xv.
Sewering, Paving, Metalling, &c., of Roads ...	do.	do.	do.	xv.
York Stone	Chelsea Vestry.....	G. R. Strachan.....	April 20th	xv.
Water Vans.....	do.	do.	do.	xv.
Guernsey Granite	Romford Local Board...	*Official*	do.	xv.
Kerbing and Paving, Drainage, Oak Fencing	Tottenham Local Board	— De Pape	do.	xv.
Kerbing, Tar-paving, &c.	Lewisham Board of Wks	*Official*	do.	xv.
Kerbing, Channelling, &c.	Richmnd (Surrey) U.S.A.	W. Brooke.....	April 21st	xv.
Painting Chelsea and Regent's Park Barracks	War Department.....	*Official*	April 24th	ii.
Clock and Bells for Town-hall	Rochdale Corporation...	A. Waterhouse	April 27th	xv.
New Post-Office, Douglas (Isle of Man)	Com. of H.M. Works...	*Official*	April 30th	ii.
Wrought-Iron Girders and other Ironwork ...	Bolton Corporation.....	J. Proctor	do.	ii.
Stoneware Pipe-Sewer, and other Works	Tiverton Town Council	Gotto & Beesley	May 1st	i.
Restoration of St. Mary's Church, Newmarket	The Committee.....	Holland & Son	do.	xv.
Works, Repairs, and Building Materials	War Department	*Official*	May 12th	ii.
Rebuilding Lock	Thames Conservancy ...	do.	Not stated	xv.
Works, Repairs, and Building Materials	War Department.....	do.	do.	ii.
Finishing Four Houses, Wood Green.....	A. T. Hawkins	.....	do.	ii.

TENDERS.

ADDISCOMBE.—For Sunday schools at Christchurch. Messrs. Potts, Sulman, & Hennings, architects. Quantities by Mr. G. Fleetwood:—

L. H. & R. Roberts.....	£2,045	0	0
J. & C. Bowyer.....	1,998	0	0
Holliday & Greenwood	1,927	0	0
Maides & Harper.....	1,898	0	0
M. Taylor	1,875	0	0
Outhwaite & Son	1,783	0	0
Smith & Son (accepted).....	1,747	0	0

BALHAM.—For alterations and repairs to six houses in Balham-grove. Mr. W. Eve, architect, Union-court, Old Broad-street:—

Wilsher	£310	0	0
Hindes	243	10	0
Hubble & Trott	242	0	0
Mitcham.....	230	0	0
Ede & Son	225	0	0
Newling	219	0	0
Avis & Son.....	198	10	0
Aldridge, Hunt, & Co.	177	10	0
Watkins	145	0	0

BEDFORD.—For a new private boarding school for ladies, to accommodate forty boarders and fifty day-scholars, to be erected in the Bromham-road, Bedford, for Mrs. E. Carroll, of Bedford. Mr. John Day, Diocesan Surveyor, architect. Quantities supplied by the architect:—

T. Spenser, Bedford	£3,449	0	0
A. Kimberley, Banbury.....	3,439	0	0
G. Haynes, Bedford	3,426	0	0
S. Foster, Bedford	3,359	0	0

BRENTFORD.—For the erection of the new Post-office buildings, at the corner of the Market-place, Brentford. Mr. T. W. Lacey, architect:—

T. Brunsden & Co.,* Brentford	£2,200	0	0

* Accepted.

BROMLEY.—For alterations and additions to Bromley Congregational Church, Kent. Messrs. Potts, Sulman, & Hennings, architects, Furnival's Inn. Quantities by Mr. G. Fleetwood:—

Stevens & Bastow.....	£4,905	0	0
R. A. Lowe	4,882	0	0
G. H. Lay	4,734	0	0
D. Payne.....	4,499	0	0
Maides & Harper.....	4,135	0	0
J. & C. Bowyer	4,128	0	0
L. H. & R. Roberts.....	3,982	0	0
Smith & Sons.....	3,919	0	0
Crossley	3,880	0	0
Harris & Wardrop	3,873	0	0
Arnaud & Son (accepted)	3,859	0	0

CLAPTON.—For renovating and decorating the "Salvation Army" Training Homes, Lower Clapton, for "General" Booth. Mr. E. J. Sherwood, architect, Queen Victoria-street:—

G. Brick, Hendon (accepted)	£189	0	0

CARDIFF.—For shops, stalls, &c., at the Cardiff Public Hall Co.'s premises, Cardiff, for the Queen-street Arcade Co., Limited. Quantities by architects, Messrs. Seward & Thomas, Cardiff:—

Shepton & Son	£3,605	0	0
Jones Bros.	3,530	0	0
C. Shepherd & Son	3,434	0	0
W. Symonds*	3,395	0	0

* Accepted, less 5*l.* credit for old materials.

CLAPHAM.—For alterations, &c., at the Studley-road Wesleyan Chapel. Messrs. Arthur Catt and Sidney R. Smith, architects, Furnival's-Inn:—

W. C. Bone	£372	10	0
D. S. Rice	340	0	0
F. Nash	330	10	0
Burman & Sons.....	301	0	0
F. Higgs (accepted)	270	0	0

Wall and Interior Decoration.
Messrs. Heaton, Butler, & Bayne (accepted).
Ornamental Lead Glazing.
F. Odell (accepted).
Gas, Sunburners, and Ventilation.
Z. D. Berry & Sons (accepted).

CROYDON.—For additions to public slaughter-houses, for the Corporation. Mr. Thos. Walker, C.E., Borough Engineer. Quantities by Mr. Robert Ridge, 7, Katharine-street, Croydon:—

Sanders	£1,060	0	0
Roberts	999	0	0
Pearson	957	0	0
Deacon	935	0	0
Barker.....	900	0	0
Bullock	899	0	0
Maides & Harper.....	889	0	0
Barton & Son	885	0	0
Bryan	879	0	0
Ledgwick	865	0	0
Page.....	845	0	0
W. G. Wyatt,* South Norwood	827	0	0
Harris	775	0	0

* Accepted.

FOLKESTONE.—For Masonic Hall and Club. Mr. Reginald Pope, architect:—

Bunning & Son, Maidstone	£2,954	0	0
Howel & Son, London.....	2,890	0	0
Patman & Fotheringham, London ...	2,873	0	0
Trollope, Walmer	2,830	0	0
Wallis & Clements, Maidstone.....	2,767	0	0
Denne & Son, Deal	2,678	0	0
Hayward & Paramor, Folkestone ...	2,666	0	0
Mercer, Folkestone.....	2,529	0	0
Webster, Folkestone	2,500	0	0
Prebble, Folkestone	2,495	0	0
Holdom, Folkestone	2,475	0	0
Tunbridge, Folkestone	2,464	0	0
Davis & Leaney, Goudhurst.....	2,410	0	0
Petts Bros., Folkestone (accepted)...	2,398	0	0
Brooks, Folkestone.....	2,395	0	0
Moody, Folkestone	2,390	0	0
Clemmans, Folkestone	2,373	0	0
Baker, Folkestone	2,346	0	0

FULHAM.—For works at the premises of the London Road Car Company, Mulgrave-road, Fulham. Mr. H. I. Newton, architect, Queen Anne's-gate, Westminster:—

Walker, Limehouse	£515	0	0
Benman & Sons, Kennington	477	0	0
Chafen, Rotherhithe	354	0	0
Lorden & Sons, Bow	335	0	0

GRAVESEND.—For a fermenting room at the Wellington Brewery, for the trustees of the late Mr. Walker. Mr. Arthur Kinder, architect, Laurence Pountney Hill. Quantities by Mr. Alfred Howard:—

Nightingale	£898	0	0
Multon & Wallis	790	0	0
Gates	750	0	0
A. C. Rayner.....	729	0	0
Goldfinch & Son	718	0	0
W. E. Wallis.....	711	0	0
W. Tuffee	699	0	0
W. H. Archer (accepted)	689	0	0

IPSWICH.—For five cottages and a stable and coach-house, Old Foundry-road. Mr. J. S. Corder, architect, Ipswich. Quantities by Mr. A. Field:—

Girling, Ipswich	£995	0	0
Graystone, Ipswich.....	975	0	0
Smith & Sons, Ipswich	915	15	0
Pells, Ipswich	910	0	0
Grimwood Bros., Sudbury	887	0	0
Smith, Ipswich.....	833	0	0

ISLE OF WIGHT.—For repairs to roadways in the Isle of Wight, for the Commissioners of Highways for the Isle of Wight.

District No. 1, East. (Mr. E. Humphreys, surveyor):—

J. Rici, Newport	£1,380	0	0
J. W. Alexander	1,295	0	0
J. W. Please, Wootton	1,289	0	0
J. Barton, Ryde (accepted)	1,249	0	0

District No. 3, West. (Mr. J. Haynes, surveyor):—

J. Rici, Newport	£1,440	0	0
J. Kingswell, Calbownie.....	1,400	0	0
J. Barton, Ryde (accepted)	1,168	0	0

District No. 4, West. (Mr. J. Haynes, surveyor):—

L. Pocock, Rookley	£1,024	0	0
J. Kingswell, Calbownie (accepted)	1,000	0	0
J. W. Alexander, Godshill	993	0	0

LONDON.—For completing two houses at Tappesfield-road, Peckham, under the superintendence of Mr. W. Eve, Union-court, Old Broad-street:—

Ede & Son	£376	0	0
Newling	334	0	0
Hubble & Trott	305	0	0
Watkins	299	0	0
Aldridge & Co.....	280	0	0
Hindes	258	0	0
Mitcham.....	250	0	0
Avis	225	0	0
Wilsher, Stamford Hill (accepted) ...	193	10	0

LONDON.—For enlargement of Messrs. Carter Paterson & Co.'s Depot, Deptford, under the superintendence of Mr. William Eve, Union-court, Old Broad-street:—

Holland	£532	0	0
Higgs	506	0	0
Exton	499	0	0
Heiser.....	497	0	0
Harris & Wardrop,* Limehouse.....	483	0	0

* Accepted.

LONDON.—For additions and alterations to No. 84, Charlotte-street, Fitzroy-square, for the German Waiters' Union. Mr. Alfred J. Hopkins, architect, Mortimer-street, Regent-street:—

Clarke	£320	10	0
Weatherilt, Lee, & Martin	253	13	0
Adams.....	245	0	0
Bartlett & Hawkins	234	0	0
Rhodes	220	0	0
Reed	197	5	0
Goy	197	0	0

LONDON.—For additions and alterations to No. 14, South-street, Manchester-square, W., for Mr. Alfred Brooking. Mr. Alfred J. Hopkins, architect:—

Kebbel & Nelson.....	£802	0	0
White	797	0	0
Terry	795	0	0
Scott	765	0	0
Isaacs	750	0	0
Adams.....	725	0	0
Ashwell	677	0	0
Smith	475	10	6

LONDON.—For drying-house for Mr. Thos. Briggs, at Southgate-road. Mr. Edwin T. Hall, architect, Moorgate-street:—

W. L. Lynde.....	£650	0	0
Edward Chubb	630	0	0
John Woodward	628	0	0

LUTON.—For the erection of Salvation Army "Barracks" in Lea-road and Vicarage-road, Luton, for "General" Booth. Mr. E. J. Sherwood, architect, Queen Victoria-street, London. Quantities by the architect:—

Cox Bros., Luton	£3,050	0	0
J. Keast, Luton	2,993	0	0
G. Kingham, Luton.....	2,879	0	0
Rance Bros., Luton.....	2,870	0	0
Hough Bros., Luton	2,469	0	0
J. Sinfield, Luton.....	2,458	0	0
Smart, Bros , Luton	2,395	0	0
T. & E. Neville, Luton	2,371	0	0
G. W. Pryer, Luton.....	2,264	0	0
F. J. Coxhead, Leytonstone.....	2,190	0	0

[Architect's estimate, £2,218.]

NEASDEN.—For building St. Saviour's Vicarage, Neasden, N.W., for the Rev. J. R. Mills. Messrs. Newman & Newman, architects:—

J. Twyford, Neasden	£1,875	0	0
J. K. Coleman, Poplar (accepted) ...	1,850	0	0

NORTH FULHAM.—For the erection of new Police Station, from the plans and under the superintendence of Mr. John Butler, Architect and Surveyor to the Metropolitan Police:—

F. & F. J. Wood	£3,483 0 0
J. M. Goodwin	3,429 11 6
G. Jenvey	3,323 0 0
Leeks & Hooker	3,300 0 0
F. R. Tozer	3,200 0 0
W. H. Smith	3,197 0 0
Pierce & Lansdowne	3,179 0 0
H. Smith & Son	3,143 0 0
J. T. Chappell	3,142 0 0
W. D. Tink	3,131 0 0
J. Grover & Sons	3,127 0 0
G. Leyford	3,125 0 0
Okenden	3,119 0 0
W. Scrivener & Co.	3,113 0 0
T. L. Green	3,112 0 0
Gibbs & Flew	3,100 0 0
J. Bull & Sons	3,094 0 0
Staines	3,048 0 0
C. Ansell	3,030 0 0
F. Higgs	3,000 0 0
A. & E. Braid	2,995 0 0
Lathey Bros.	2,990 0 0
J. Brigant	2,984 0 0
E. C. Howell & Sons	2,954 0 0
Higgs & Hill	2,940 0 0
Balaam Bros.	2,900 0 0
W. Johnson	2,890 0 0
C. Barnes	2,889 0 0
E. Toms	2,867 0 0
Kirk Bros.	2,858 0 0
Tack Bros.	2,769 0 0
G. Stephenson	2,761 0 0
Stimson & Co.	2,740 0 0
P. H. Dawes	2,685 0 0

RAMSGATE.—For certain alterations to shop-front of No. 6, Harbour-street, Ramsgate, for Mr. F. Green. Mr. Mr. E. L. Elgar, architect:—

C. Collins	£58 10 0
W. W. Martin	57 0 0
H. Miller	56 0 0
T. Elgar (accepted)	47 0 0

RAMSGATE.—For the erection of three cottages in Rodney-street, for Mr. G. J. Norris. Mr. E. L. Elgar, architect:—

H. Miller	£798 0 0
R. Stock	744 16 10
White Bros.	620 0 0
Grummant	585 0 0
J. Myles	563 0 0
H. Port	555 0 0
H. Bowman	549 0 0
T. Elgar	545 0 0
Bugden	493 0 0
W. W. Martin	480 0 0

RAMSGATE.—For the erection of a dwelling-house and shop on Abbot's Hill, Ramsgate, for Mr. L. Hart. Mr. E. L. Elgar, architect:—

J. Newby	£314 0 0
T. Elgar	297 0 0
J. Myles	295 0 0
H. Bowman	278 0 0
White Bros.	250 0 0
W. W. Martin	214 0 0
Newby Bros.	207 10 0
H. Miller (accepted)	205 0 0

RICHMOND (Surrey).—For the erection of a cottage and shoeing forge for Mr. W. Wise. Mr. E. Maynard, architect, College Chambers, Richmond. Quantities supplied:—

Pierce & Lansdown	£547 0 0
Lillywhite	520 0 0
Blasby	512 0 0
Maton	489 0 0
Sweet & Loder (accepted)	484 0 0

TOXTETH PARK (Liverpool).—For the re-construction of the carriageway in Smithdown-road, between Lodge-lane and Salisbury-road. Quantities supplied by the engineer, Mr. John Price, Assoc. M. Inst. C.E.:—

Sayce & Randle, Widnes	£552 3 6
Worthington & Pownall, Manchester	474 1 0
C. Burt, Liverpool	447 0 0
J. Randall, Weaste, Salford	415 8 3
W. Vaughan, Longsight, Manchester	395 0 0
Ireland & Hurley, Liverpool	389 1 0
Catterall & Co., Liverpool	362 6 7
R. Lomax, Eccles	334 13 8
W. F. Chadwick, Liverpool	320 0 0
L. Marr, Toxteth Park	288 2 11
Walkden & Co., Bootle	273 18 9

[Engineer's estimate, 270*l.*]

TOXTETH PARK (Liverpool).—For the construction of sewers in Smithdown-road, between Claremont and Greenbank roads, for the Toxteth Park Local Board. Quantities by the engineer, Mr. John Price, Assoc. M. Inst. C.E.:—

Anwell, Wainwright, & Dyson, Liverpool	£792 17 2
Maccabe & Co., Liverpool	772 12 5
Sayce & Randle, Widnes	751 8 8
J. Randall, Weaste, Salford	749 3 8
Worthington & Pounall, Manchester	722 17 5
W. Vaughan, Lonsight, Manchester	698 10 0
J. White, Toxteth Park	676 16 7
Walkden & Co., Bootle	675 3 9
R. Lomax, Eccles (accepted)	587 12 6
W. F. Inglis, Liverpool	524 16 6

[Engineer's estimate, 630*l.*]

SHEERNESS.—For the erection of sixty-six houses at Sheerness:—

H. J. Carter, Grays (accepted) £8,539 10 0

Re Additions at "Holmleigh," Putney.—The name of the firm whose tender was accepted should have been printed in our last (p. 529) as "Lorden & Son," *not Corden.*

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